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THESIS

SNAP-II: A POST IMPLEMENTATION REVIEW OF
USER CONCERNS ON SELECTED SHIPS

by

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March 1986

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SNAP-II: A Post Implementation Review of User Concerns on
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ABSTRACT

This thesis gives a short, concise description of the U.S. Navy SNAP-II (Shipboard Non-Tactical Automated Data Processing Program) computer system, and through a post implementation review of six ships having the system installed, delineates concerns and problem areas with the SNAP-II system as perceived by the end-users. Major areas of concern that emerged were training, documentation, and the role of management in relation to the SNAP-II system, both internal and external to a U.S. Navy ship. An analysis of these issues is conducted and is the basis for recommendations on how to improve the SNAP-II program.

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I. INTRODUCTION

The SNAP-II (Shipboard Non-tactical Automatic Data Processing Program) program was initiated in response to a Chief of Naval Operations (CNO) objective to reduce the administrative burden on shipboard personnel, which would have a resultant improvement in fleet readiness and a positive effect on the morale and retention of personnel.

As conceptualized, the system would provide automatic data processing equipment to small surface ships and submarines, reducing the manual burden on personnel in the administration of maintenance, supply, and pay and personnel matters. The system was designed for a life cycle of twenty years, with a key proviso in its charter being that additional personnel would not be required to operate or maintain the equipment.

The program has been referred to by various agencies as a "Real-time MIS" [Ref. 1:p. 1], a system to "provide automated support for maintenance, supply, and pay and personnel functions" [Ref. 2:Encl. (3), p. 5], and "Automated Information System" [Ref. 1:p. 1] and [Ref. 3:p. 1], all of which have different connotations of expected use.

The current program calls for the installation of a total of 459 SNAP-II systems--17 at shore sites for training and support, and 442 on afloat units. As of 31 January 1986, 105 systems have been installed afloat (55 Pacific fleet, 50

Atlantic fleet) and three at shore locations. No submarines have yet had the system installed, although the first installation has been scheduled to start in January 1986.

With almost one-third of the systems installed in the fleet, a need was perceived to obtain user feedback to ascertain just how the "fleet" was receiving the SNAP-II system and whether they were satisfied with the product. Subsidiary questions of whether the system was being utilized to its full capability by fleet units and adequately supported by the shore establishment were also of importance.

The purpose of this thesis is to investigate end user satisfaction with the SNAP-II program, identify concerns and discuss emergent issues that may be of significance. This was accomplished through a post-implementation review of six ships, three of the Atlantic Fleet and three of the Pacific Fleet. As no submarines currently have the system installed, they were excluded. The reviews were conducted in January 1986, using both open and closed format interview techniques. Personnel interviewed ranged from the Commanding Officers to senior enlisted personnel. The main thrust of the interviews was on a perceptive or subjective basis. Quantitative information was neither sought nor desired.

Program and System descriptions are included in Chapters II and III, with the individual ship reviews and summaries contained in Chapters IV and V. Discussion of emergent issues follows, with conclusions and recommendations appearing in the final Chapter.

II. SNAP-II PROGRAM ORGANIZATION

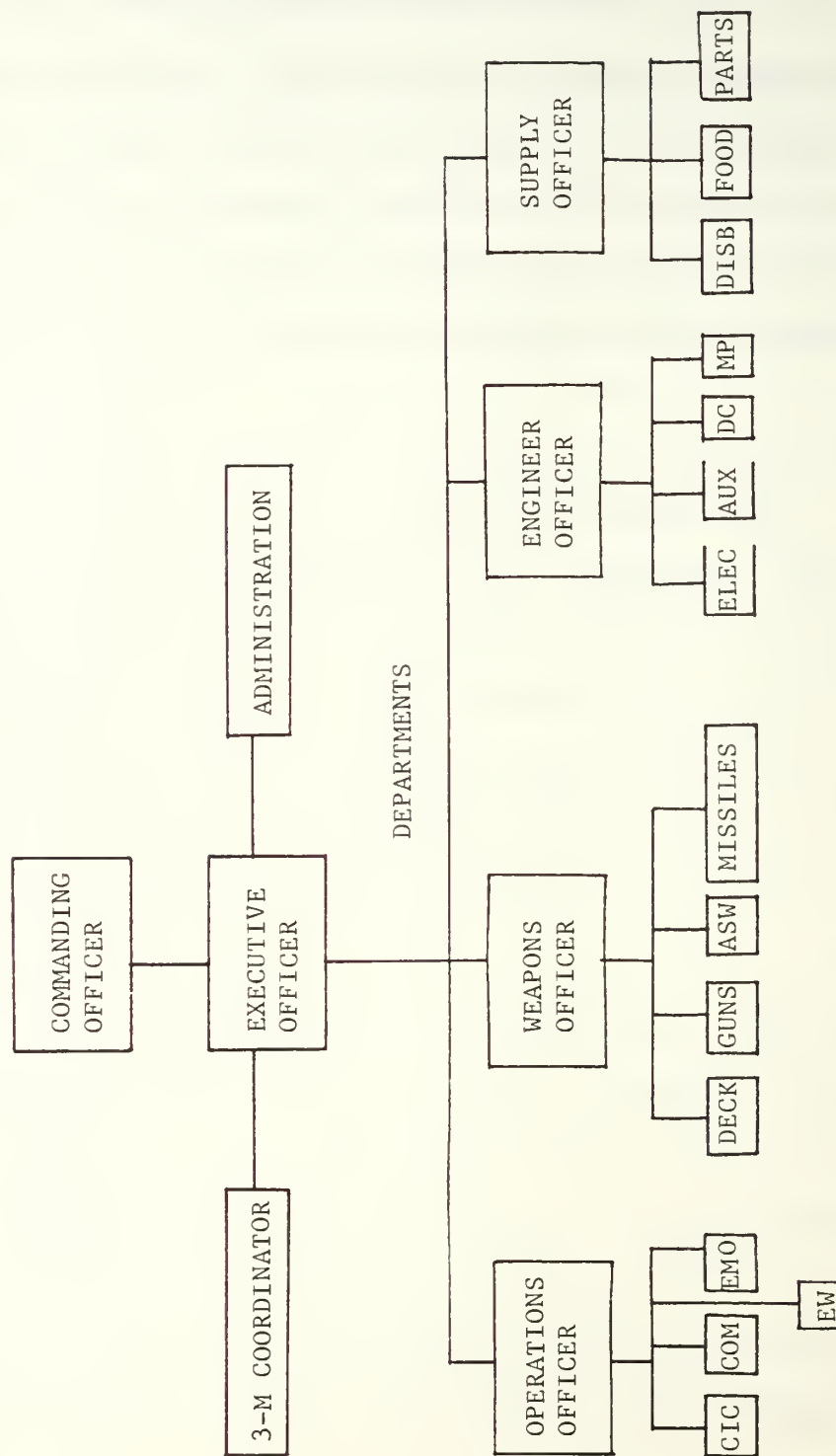
Program Organization is divided into two areas--the internal organization of the ship (afloat), and the Navy wide organization (ashore) that manages implementation, any changes to program direction, and provides assistance to correct material casualties affecting the SNAP-II software and hardware.

A. SHIP'S INTERNAL ORGANIZATION

With minor variances, the internal administrative organization of a typical Navy ship is shown in Figure (1). Variations will exist between types of ships. A department is composed of several divisions, and each division is composed of one or more work centers, which are the basic units for maintenance administration and personnel assignments.

A department is headed by an experienced officer, with the divisions headed by junior officers. The work centers are headed by senior enlisted personnel.

Superimposed on this organization is the SNAP-II Organization, Figure 2, which utilized the same personnel from the administrative organization in a secondary, or collateral duty basis to administer, operate and maintain the system.



NOTE: EACH DIVISION IS COMPRISED OF ONE OR MORE WORK CENTERS

Figure 1. Shipboard Administrative Organization

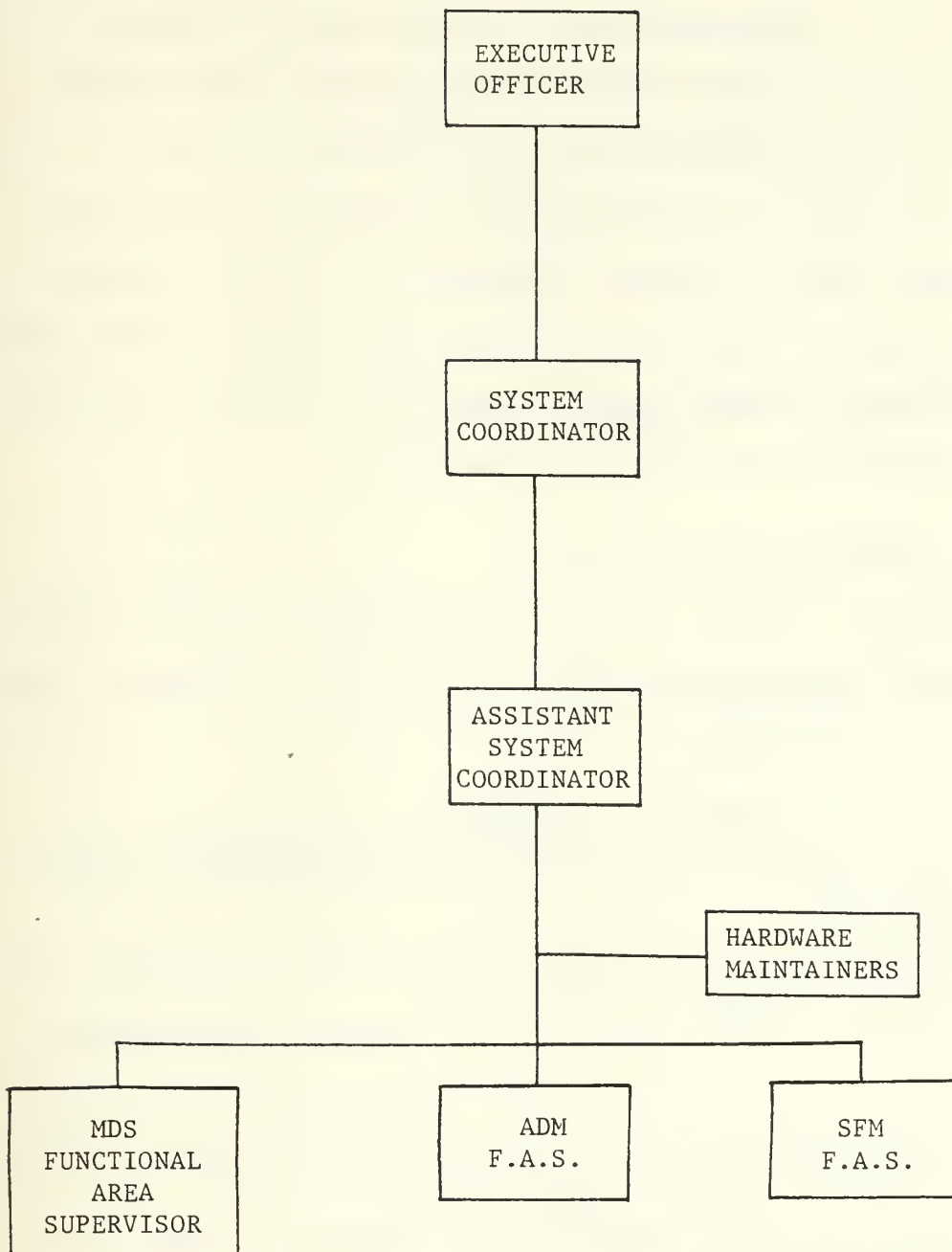


Figure 2. Shipboard SNAP Organization

The guidelines on who performs what SNAP-II tasks are contained in formal instructions issued by the Type Commanders. (The role of the Type Commander is delineated in Figure (3). Of note is that the Type Commander has issued instructions concerning only the management of the SNAP-II system. Guidance as to how to manage with the system has not been issued at any level--shipboard managers are left to their own initiative as to how to integrate the system within their management structure and style. Specific SNAP jobs and their responsibilities are covered in Chapter III.

B. SNAP-II PROGRAM ORGANIZATION

The SNAP-II program organization extends from the Office of the Chief of Naval Operations down to the individual ship; its purpose is threefold:

- install and implement the program
- repair any casualties to hardware or software
- provide guidance and policy relevant to program changes and direction

Figure (4) delineates the organizational relationships, but does not attempt to show the funding flow for the program.

Several terms must be defined to understand the program:

- Program Sponsor--that office charged with overall policy guidance concerning the SNAP program
- Program Manager--coordinates all aspects of the SNAP-II program
- Functional Sponsor--for each of the functional areas, certifies individual requirements to program manager and functional manager
- Functional Manager--executes the guidance of the Functional Sponsor by generating requirement specifications for software that must be developed.

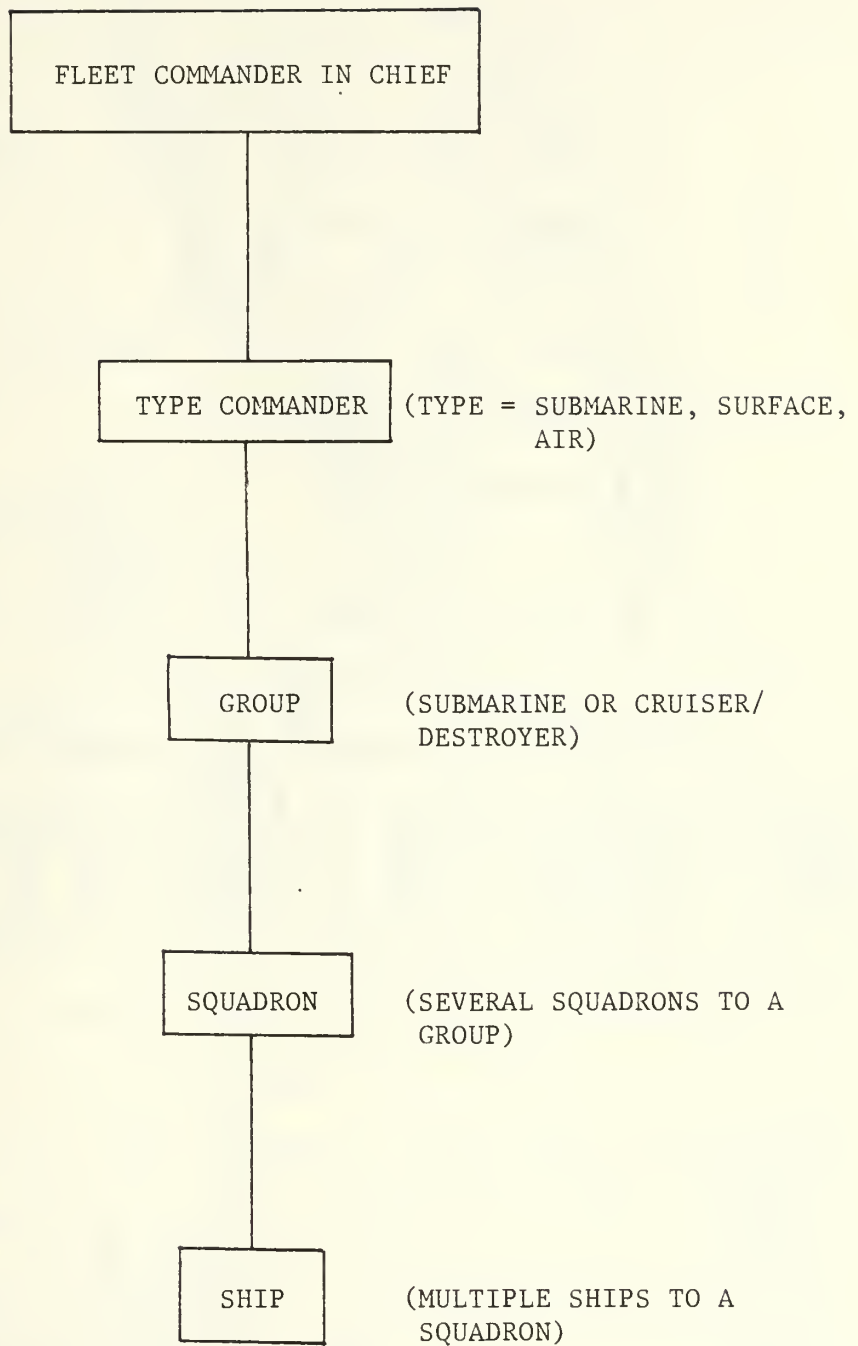


Figure 3. Fleet Administrative Organization

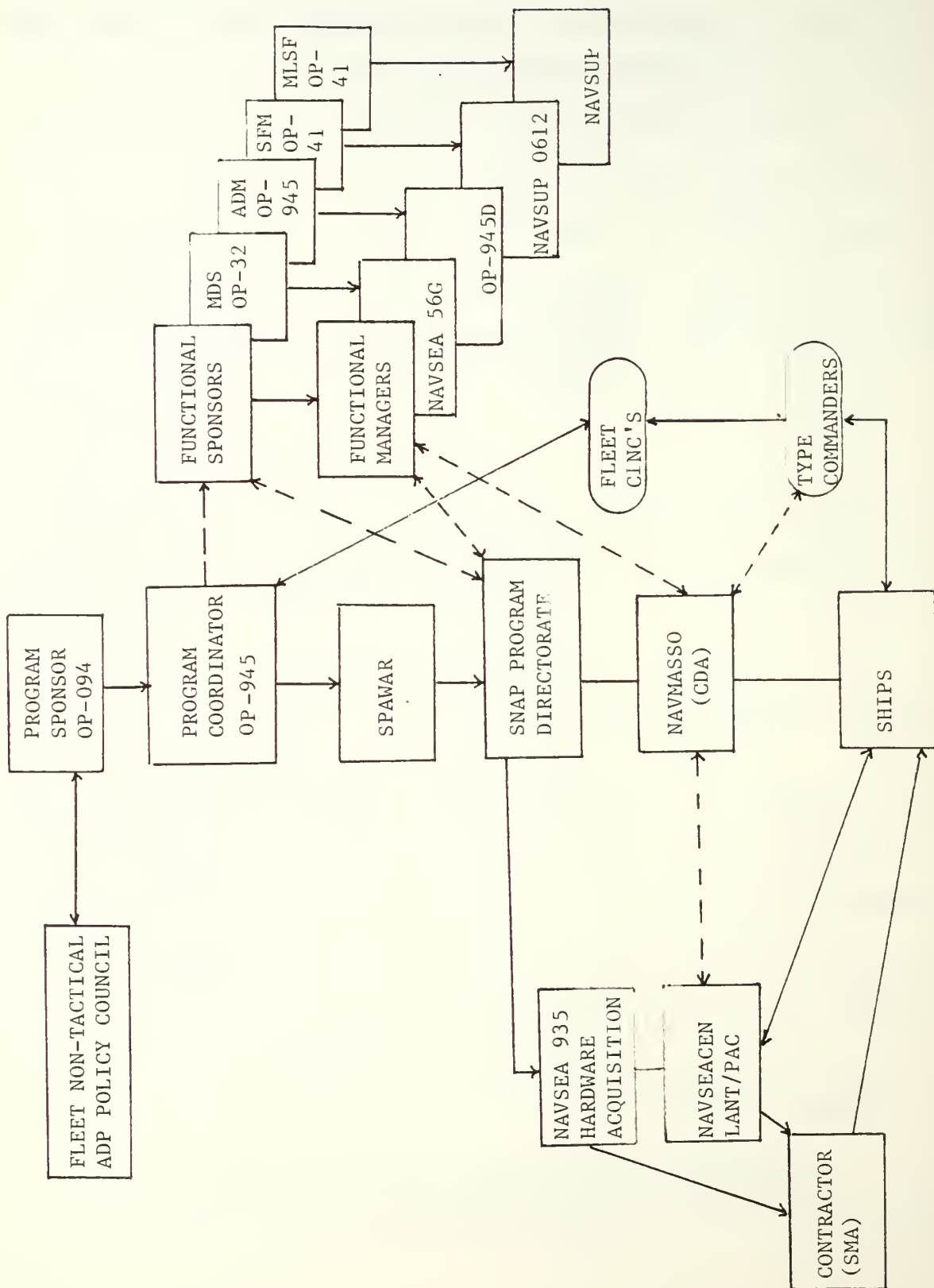


Figure 4. SNAP II Program Management

To execute SNAP-II installation and implementation, two agencies are directly involved: Naval Sea Systems Command (NAVSEA) and Navy Management Systems Support Office (NAVMASSO). (The Type Commander is involved only from the aspect of scheduling). NAVSEA, through NAVSEA Support Centers (NAVSEACEN's) on the East and West coasts, supervises the installation of system hardware, which is done by the contractor, Systems Management American (SMA) Corporation. Software installation is accomplished by NAVMASSO, who has also assumed the responsibilities for coordinating the initial implementation on ships.

Problems that develop after implementation are also handled by these two agencies--hardware problems by NAVSEA, software problems by NAVMASSO. Problems can be reported through the formal CASREP method, or handled by initiating "Trouble Reports" to NAVMASSO for software problems, or "Direct Fleet Support" requests to the Type Commander for hardware problems, who will then coordinate action with NAVSEACEN's [Ref. 4:p. 1] and [Ref. 5:p. 1].

User feedback for improvements or additions to the SNAP-II system is handled via a formal mechanism called "change proposals". They are forwarded by the ship to the Type Commander [Ref. 4:Encl. (3)] and [Ref. 5:Encl. (2)], who in turn will assess them and forward them to the Fleet Commander-in-Chief (The Type Commander may forward the change proposal to NAVMASSO for a cost-benefit analysis if that has not been

done.)). If the proposal has sufficient merit, it will be sent to the Program Coordinator (OP-945), who will pass it to the appropriate Functional Sponsor. The Functional Sponsor will approve/disapprove the proposal, and task the specific Functional Manager to develop specifications for the change if the request is approved.

NAVMASSO incorporates the changes as directed by the Functional Managers, and the change is distributed to the fleet via updates to existing software or by completely new versions of the software.

Issues of sufficient importance that cannot be resolved at the higher levels due to funding constraints or policy implications are referred to the Fleet Non-tactical ADP Policy Council. [Ref. 6:p. 4]

III. SNAP-II SYSTEM DESCRIPTION

A brief description of the SNAP-II system elements is necessary to understand the essence of the system and the environment within which the system operates. These elements are:

- Installation/implementation
- Hardware
- Software
- Personnel
- Training

A. INSTALLATION/IMPLEMENTATION

1. Principal Agencies

There are three principal agencies that deal with an individual ship to install and implement the SNAP-II System:

- Type Commander
- NAVSEA
- NAVMASSO

The Type Commander is responsible for coordinating the ship's schedule for installation, obtaining training for the ship's Hardware Maintainers, and monitoring the progress of installation. [Ref. 7:p. 3]

The respective NAVSEA Support Centers (Atlantic and Pacific) supervise the contractor's installation of hardware, coordinating their activities with NAVMASSO and participating in hardware certification [Ref. 8:p. 10-1]. Although not directly involved in hardware installation, NAVMASSO

coordinates the entire evolution and monitors progress through a "Milestone Tracking System" [Ref. 9:p. A-2].

2. Software and Training

Software and initial user training are the responsibility of NAVMASSO. Once the hardware is installed and certified as operational, the software installation and the loading of the data bases is done by NAVMASSO.

Once software has been installed, NAVMASSO conducts training on board the ship for a period of two weeks.

3. Hardware

The hardware installation can take three to seven weeks, depending on the class of ship (Table I). Table II was compiled from various sources previously cited and delineates a "typical" installation schedule for a ship. Prior to commencing the installation, site surveys and preparations will be conducted by the contractor under NAVSEACEN supervision. The contractor is responsible for providing all equipment and material incident to hardware installation [Ref. 7:p. 3].

4. Data

Software installation is preceded by the construction of various SNAP-II data bases. The ship itself is the source of the following items of data [Ref. 9:pp. 11-17]:

- ship organizational information
- ship personnel data
- stock record card (NAVSUP 1114) data
- material outstanding requisition file
- COSAL
- financial data

TABLE I
HARDWARE INSTALLATION LENGTH

<u>Ship Class</u>	<u>Installation Period</u>
FFG	3 WEEKS
DD/FF/LST	4 WEEKS
DDG/AE/AO	5 WEEKS
AOR/CG/LPD	6 WEEKS
CGN/BB	7 WEEKS

TABLE II
SHIPBOARD IMPLEMENTATION EVENTS

<u>ACTION DATE</u>	<u>EVENT</u>	<u>RESPONSIBILITY</u>
D-180	IDENTIFY SCHEDULE IDENTIFY SHIP'S CURRENT ADP EQUIPMENT	NAVMASSO/TYCOM NAVMASSO
D-60 TO 90	PRE-IMPLEMENTATION BRIEF SITE SURVEY STOCK RECORD CARD SURVEY OBTAIN TRAINING QUOTAS DATA COLLECTION FORMS TO SHIP	TYCOM NAVSEACEN TYCOM TYCOM/NAVMASSO NAVMASSO
D-49/D-21	SITE PREPARATION/INSTALLATION (DEPENDING ON SHIP CLASS)	NAVSEA/CONTRACTOR
D-30	DELIVER DATA FORMS TO NAVMASSO	SHIP
D-23	CSMP CUTOFF	SHIP/TYCOM
D-17	STOCK RECORD BATTERY, OUTSTANDING REQUISITION FILES PICKUP (FOR CONVERSION)	NAVMASSO/SHIP
D-14	STOCK RECORD BATTERY/FILES RETURNED TO SHIP	NAVMASSO
D-1	HARDWARE SYSTEM TEST, NAVY ACCEPTANCE	NAVSEA/CONTRACTOR
D-0	SOFTWARE/DATA BASE LOAD	NAVMASSO
D+1	USER TRAINING ON BOARD	NAVMASSO
D+30	SUBMIT ADPPRS DATA TO TYCOM SUBMIT OPNAV 4790/CK'S	SHIP

External sources that provide data that will be integrated into the ship's data bases are as follows:

- SPCC//NAMMSO--Weapon Systems File (WSF)
- Type Commander--CSMP
- NMPC--personnel data
- NWS Concord--MEASURE data

The collection of all the above information is the responsibility of NAVMASSO, who will convert them to electronic media or supervise a contractor who will perform the work. It should be noted that any activities or transactions that affect the various ship's files/records that occur during the conversion period when NAVMASSO is constructing the various data bases must be saved by the ship and entered in the SNAP-II System after implementation. The specific responsibilities are outlined in the SNAP-II Implementation Planning Document, promulgated by NAVMASSO [Ref. 9:pp. 7-11].

B. HARDWARE

1. Configuration

The description of the hardware is divided into three areas:

- Central Processing Unit (CPU) and Memory Devices
- Peripheral Input/Output Devices
- Support Equipment

The exact configuration for each ship class is shown in Table III, with the relationship of the equipment layout illustrated in Figure (5) [Ref. 8:pp. 2/1-2/9].

2. CPU

The Central Processing Unit is an off-the-shelf commercial product, the HARRIS H300 mini-computer. It is

TABLE III
SNAP-II HARDWARE ALLOWANCE BY SHIP CLASS

<u>Hardware</u>	<u>Manufacturer</u>	<u>Large/ Trident</u>	<u>Class Medium /SSBN</u>	<u>SSN</u>
CPU	Harris H500	1	1	1
Word Processing Printer	NEC Model 7710	4	2	0
Display Printer	FACIT Model 4500	8	2	1
Line Printer	Printonics Model P-300	2	2	1
Floppy Disk Drive	SMS	2	2	1
Terminals	Beehive Intl Model 8586	17	13	*
Card Readers	ITL	1	1	0
Paper Tape Reader	Remex	1	1	0

* Nine locations available for terminal hook-up

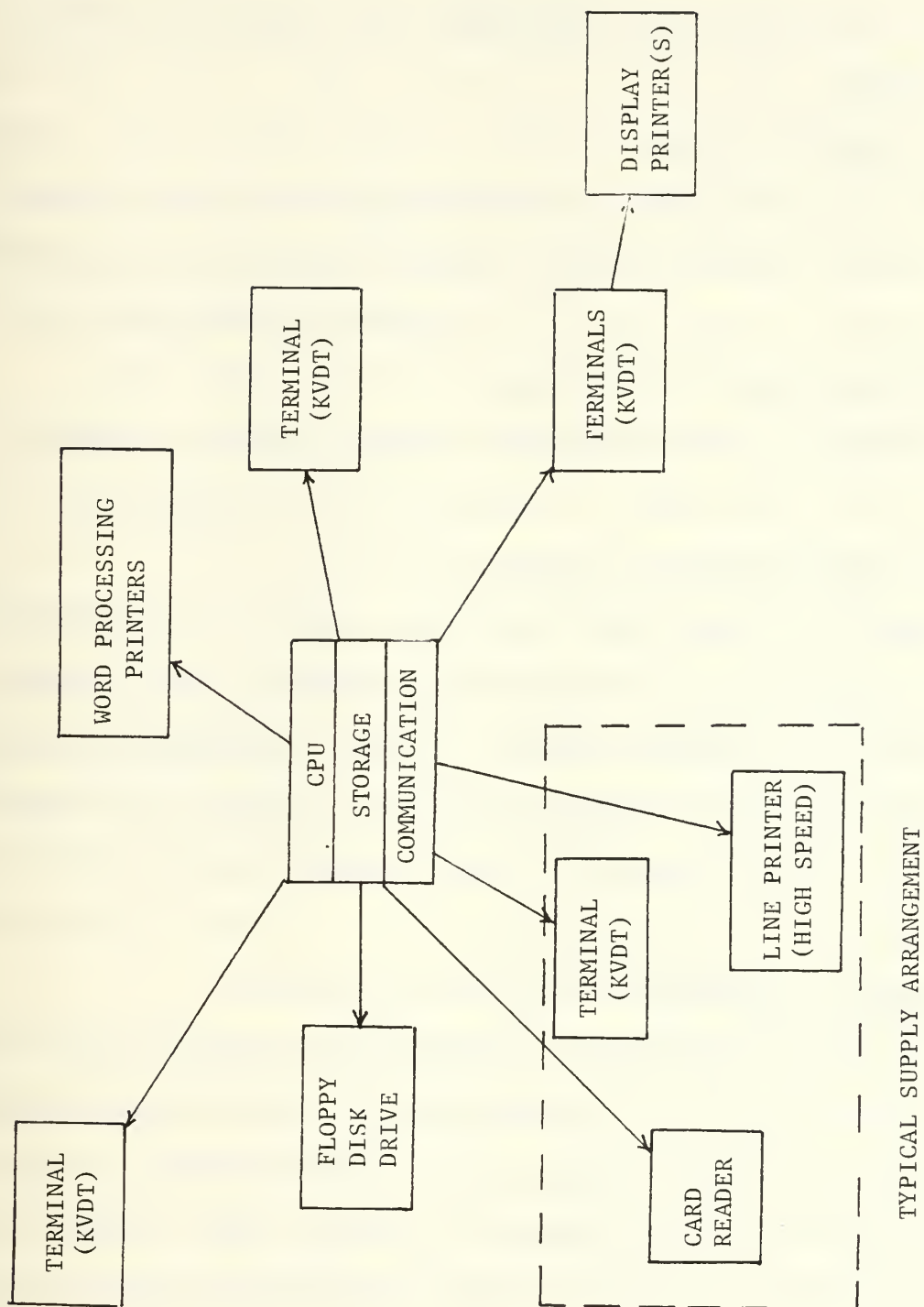


Figure 5. SNAP II User Hardware

installed in a rack cabinet that also includes Hard Disk Memory Storage Units, perforated paper tape and magnetic tape input/output devices. Another input/output device, the floppy-disk drive, is co-located in the same compartment as the CPU and rack cabinet.

3. Peripheral Devices

The peripheral input/output devices include the user terminals (KVDT--Keyboard Video Display Terminals), various types of printers, and a paper card reader, which is usually installed in the Supply Department.

The KVDT's are the devices through which the users interact, or use, the SNAP-II system. It is a Cathode Ray Tube (CRT) with a keyboard attached.

There are three kinds of printers associated with the system. A line printer is used in high volume printing jobs using 16 inch wide computer paper. A word processing printer produces letter-quality correspondence on standard size paper and a display printer provides a copy of what the user is actually seeing on his KVDT screen.

4. Support Equipment

The support equipment installed will be discussed only briefly, as the user is not directly concerned with them. These include electrical compensators for protecting system components from electrical outages or surges, and the communications subsystem, which allows for communication from the CPU to the various memory devices and peripheral equipments, such as printers and KVDT's.

C. SOFTWARE

The SNAP-II system was designed to "reduce the burden on shipboard personnel and freeing personnel resources for use in other areas." [Ref. 1:p. 1] The software, written in COBOL, embodies this goal. Software is the collection of programs that are used to perform tasks (e. g., controlling hardware, maintaining the CSMP, inventory management).

1. Software Categories

The SNAP-II software is divided into two general categories: system software and application software.

a. System Software

System software consists of operating system programs and utilities. The operating system controls the hardware, and the utility programs are used to perform general functions in support of all software. The system software is provided by Harris as part of the hardware package. The following is a brief description of the software provided:

(1) Vulcan Operating System (VOS). An operating system is a group of programs that "govern the control of equipment resources such as processors (CPU), main storage memory, secondary memory (disk, tape), Input/Output devices, and files." [Ref. 9:p. 1] In simple terms, the operating system makes the hardware work together to achieve the intended results of the application software.

(2) Utilities. The following utilities are provided:

- MUSE--a word processing program
- BASIC--a programming language
- Sort/merge--a file processing program

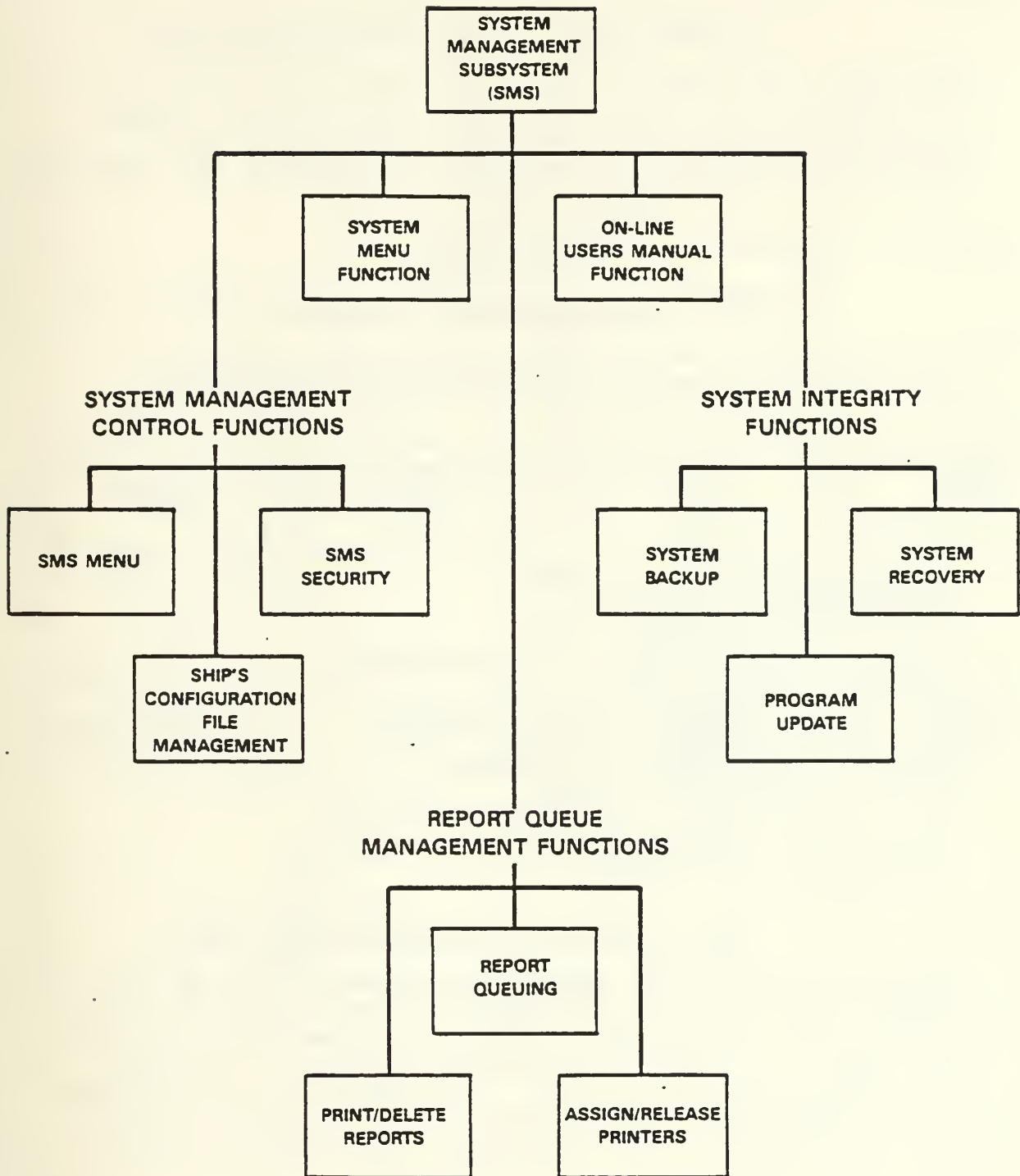
b. Application Software

The application software is designed, developed, and maintained by NAVMASSO, the Central Design Activity (CDA). The following are descriptions of the subsystems that comprise the application software:

(1) System Management Subsystem (SMS). The SMS "performs system management and service tasks in support of the other functional subsystems." [Ref. 8:p. 2-19] SMS controls file access, provides on-line user manuals, controls report queuing, and provides user-to-user message processing. "The SMS also ensures the protection of system data integrity by providing backup, recovery, and transaction logging functions." [Ref. 8:pp. 2-19] Figure (6) depicts the SMS subsystem.

(2) Maintenance Data Subsystem (MDS). MDS will consist of the Organizational Maintenance Management System (OMMS) and the Planned Maintenance System (PMS) when released.

The Organizational Maintenance Management System (OMMS) provides organizational maintenance capability. This system includes 3-M functions related to the Current Ship's Maintenance Project Master (CMPM) data base. This data base consists of Maintenance Data System (MDS) actions, Configuration Change (CK) actions, Ship's Force Work List (SFWL) action, TECDOC maintenance, and MEASURE. [Ref. 11:p. 3]



SYSTEM MANAGEMENT SUBSYSTEM

FIGURE 6

Figure (7) depicts the MDS subsystem.

(3) Supply and Financial Management (SFM).

The Supply and Financial Management Subsystem (SFM) provides support for those functions specifically related to supply and financial management, including parts ordering and monitoring, inventory management and financial budgeting and reporting. [Ref. 11:p. 3]

Figure (8) depicts the SFM subsystem.

(4) Administrative Data Management (ADM). This subsystem provides support for administrative functions relating to personnel management. Figure (9) depicts the ADM subsystem. This subsystem's programs include the following:

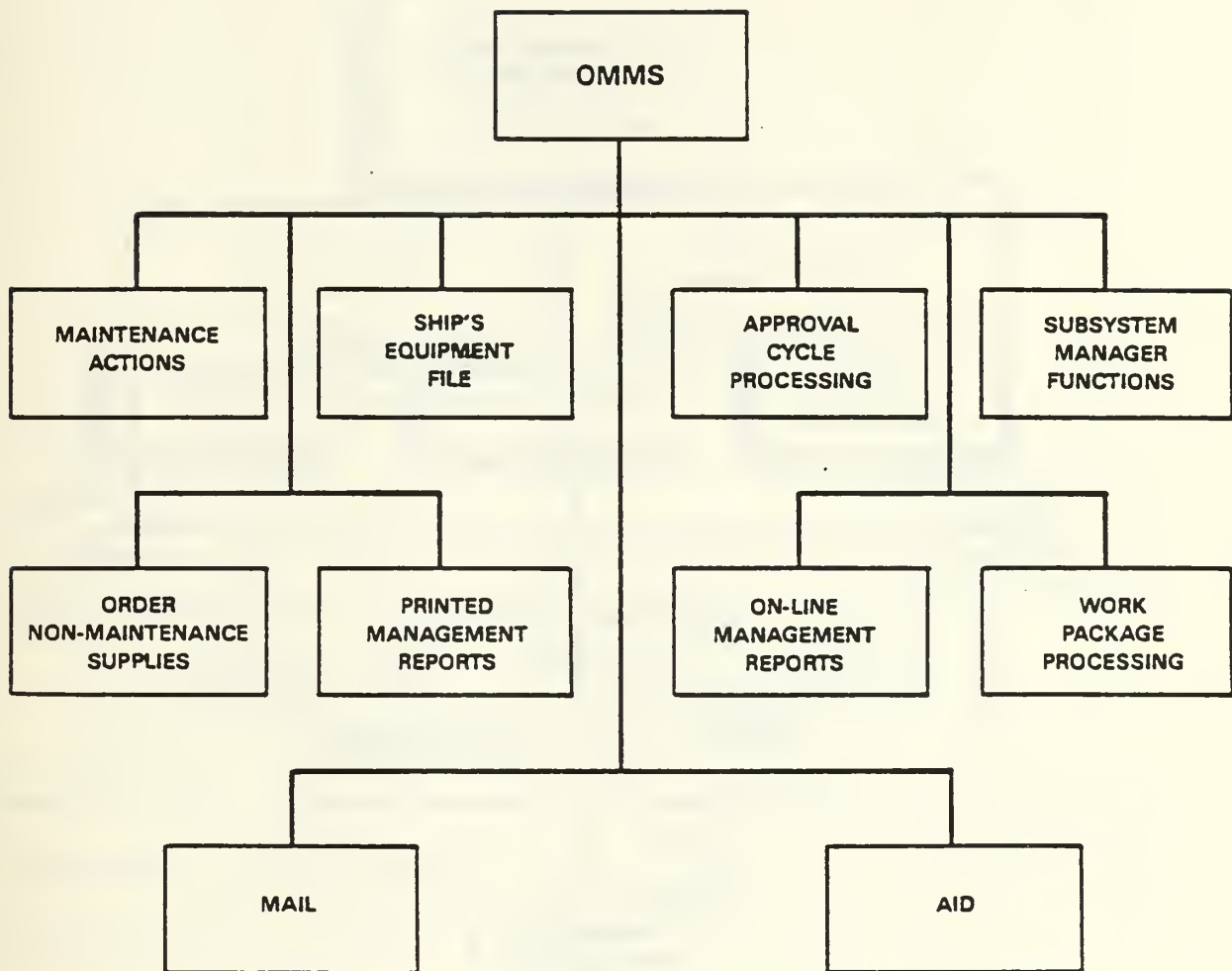
- control of berthing assets
- assignments to lifeboats
- personnel assignments
- watch bill preparation and coordination
- personnel school data
- security information on personnel
- department/division records
- immunization status of personnel
- medical examination status
- medical and dental appointment control
- advancement and career counselor data
- prospective gains/losses

(5) Mobile Logistics Support Force (MLS).

The MLS automated data processing system interfaces and supports the replenishment functions aboard AE, AO, AOE, and AOR class ships. It automates all Special Accounting Class (SAC) 224 material handling processes, including producing necessary reports. Additionally, it interfaces with the Underway Replenishment (UNREP) system on board AFS's and produces fleet commander statistical reports. [Ref. 1:p. 16]

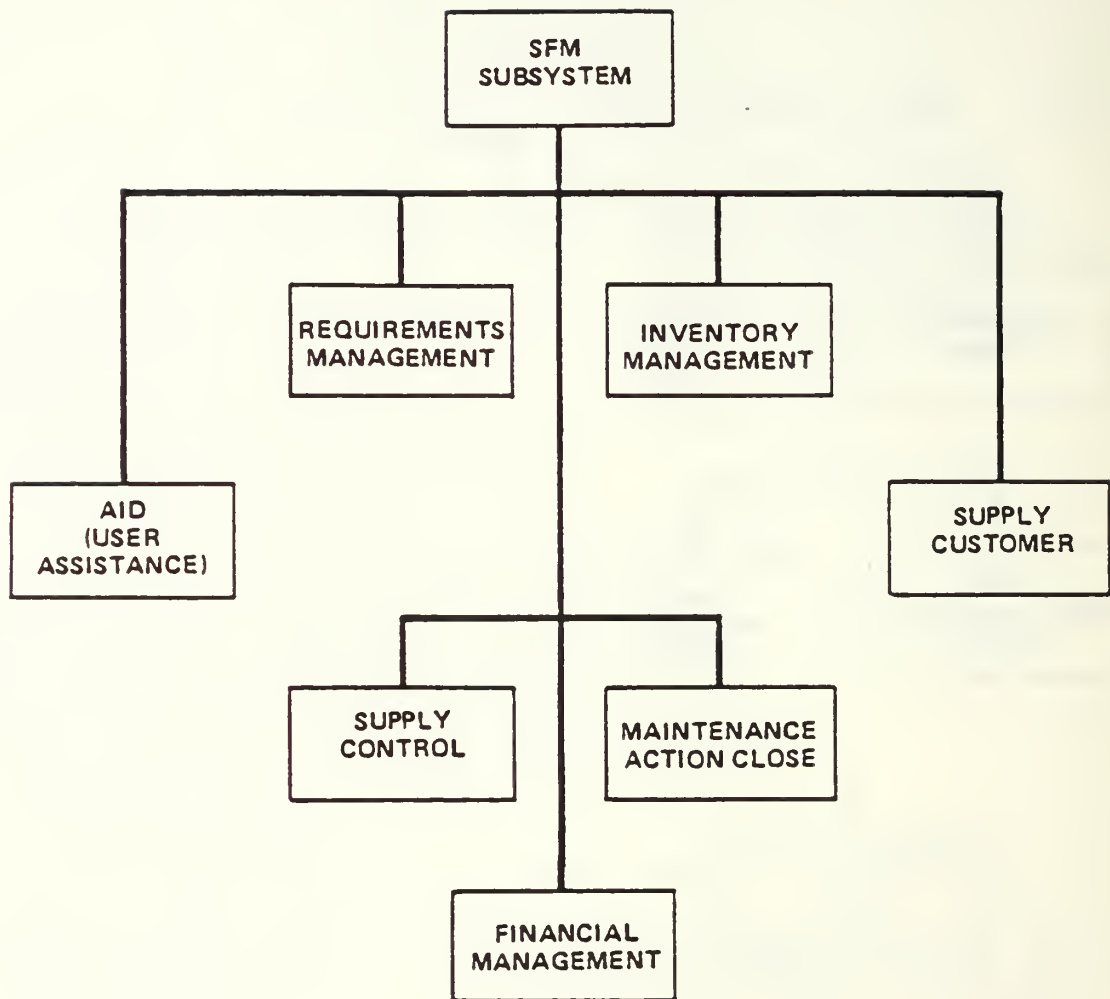
2. Fleet Introduction of Software

NAVMASSO Introduces software to the fleet by the following methods:



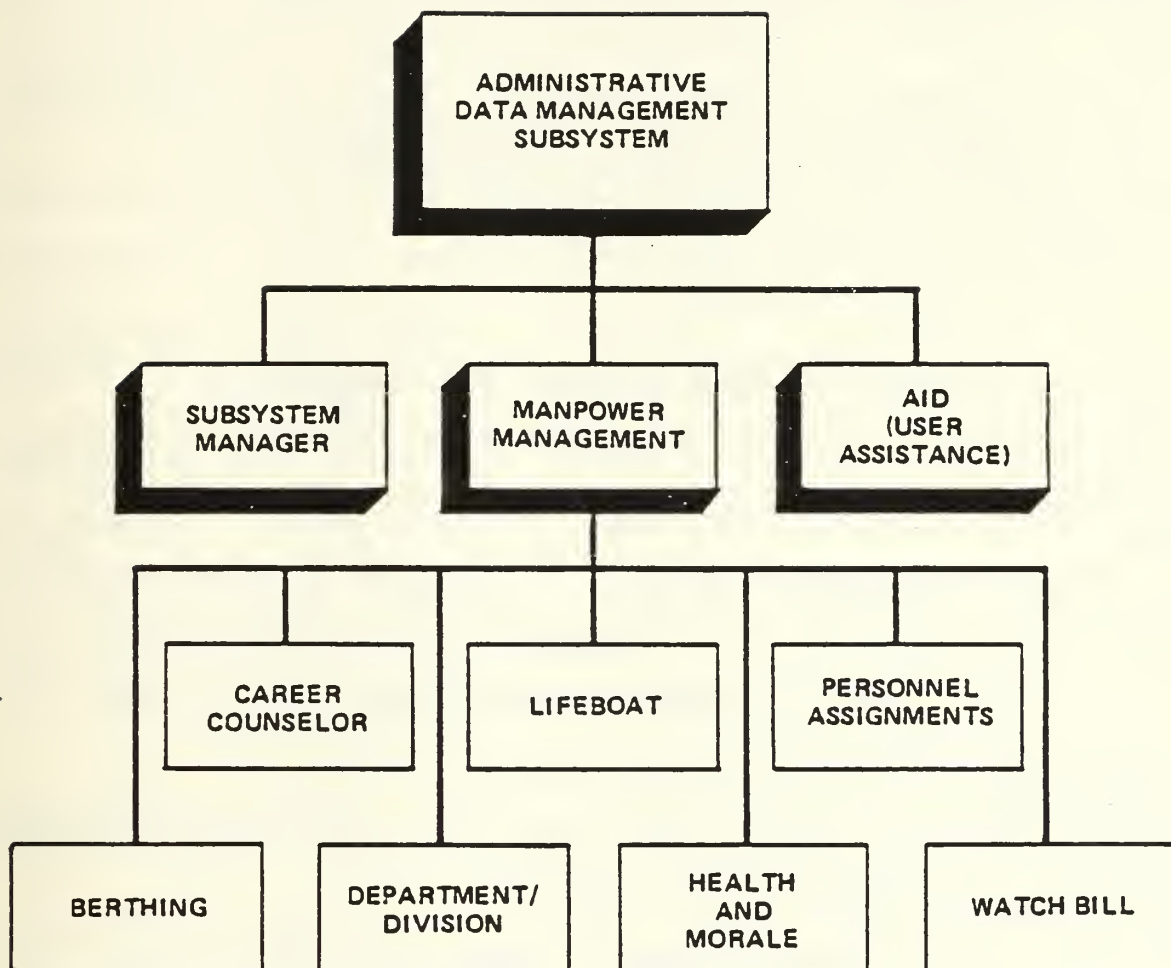
ORGANIZATIONAL MAINTENANCE MANAGEMENT SUBSYSTEM

FIGURE 7



SUPPLY AND FINANCIAL MANAGEMENT SUBSYSTEM

FIGURE 8



ADMINISTRATIVE DATA MANAGEMENT SUBSYSTEM

FIGURE 9

- implementation on ships without SNAP-II
- back fit of new releases on ship's with SNAP-II
- interim changes to existing programs

Implementation and back fit of releases are accomplished by NAVMASSO personnel. NAVMASSO uses releases to introduce new subsystems or major changes to existing programs. Interim changes (updates) to programs are forwarded to the ships by mail and the ship's System Coordinator loads the update into the SNAP-II system. A summary of software releases is provided for historical perspective.

a. Initial release

(1) Maintenance Data Subsystem (MDS). The initial release provided the user with the basic programs to process maintenance actions into the Ship's Force Work List (SFWL) and the ability to enter data used to generate supply material requirements for both internal and off-ship processing.

(2) Supply Financial Management (SFM). The initial release provided the user with limited automated support for parts ordering and monitoring, inventory management, and financial budgeting and reporting.

(3) System Management Subsystem (SMS). The initial release provided control over all subsystems and user ability to review the on-line User Manual's.

b. Release 2

(1) MDS. This release added programs for Current Ship's Maintenance Project (CSMP), completing maintenance actions (CK generation), test equipment calibration function

(MEASURE), Ship's Equipment File (SEF) and an expanded Technical Document (TECDOC) Module.

(2) SFM. This release added programs for on-line requisition status processing, requisition history processing, Requisition Status File, Requirements Report and enhancements to reports.

(3) Administrative Data Management (ADM). This subsystem provided the data base and programs for manpower management, visitor control, and query language for report creation and generation.

(4) SMS. This release added programs for update processing (adding interim changes), system access, backup procedures, system recovery procedures, output to paper tape or magnetic tape, peripheral equipment management and additional security enhancements.

c. Release 3

Release 3 of the software experienced extremely slow response times and "due to the amount of effort required to correct these problems" [Ref. 1:p. 4] the release was only installed at two cities.

d. Release 4

Release 4 incorporated several vendor updates to improve system response time. These updates provided for more efficient data storage and retrieval, freeing up of disk space, and the ability to link one program to another. Release 4 included the following updates to subsystems:

(1) MDS. This release added a program for bulk CSMP input.

(2) SFM. This release provided enhancements to financial program reports, requisition processing, and inventory reports.

(3) ADM, SMS, MLS. This release provided enhancements to provide greater accessibility and capability to existing programs. (Mobile Logistics Support (MLS) program was added as part of an update to Release 2).

e. Approved Software Changes to SNAP-II

The following are the planned modifications to existing programs and additional programs that have been approved for implementation:

(1) Release 5

Release 5 is projected to be introduced in FY 1986. The programmed modifications are as follows:

- SFM Transaction Ledger
- SFM Inventory/Financial Audit Trail
- SFM Inventory Level Setting
- MDS Automated COSAL Maintenance
- MDS Multiple COSAL Support

(2) Release 6

- SFM DLR Carcass Tracking System
- LOGMARS receipt processing
- Submarine supply/financial
- Effectiveness Report

f. Future Planned Applications

- Training
- Planned Maintenance System (PMS)
- Aviation Maintenance Subsystem (AMS)
- Light Airborne Multipurpose System (LAMPS)

- Logistics Application of Automated Marking and Reading Symbols (LOGMARS)
- Food Services
- Retail operations
- Medical and dental
- Source Data System Afloat (SDSA)--Disbursing and Personnel
- Ship's Force Overhaul Management System (SFOMS)
- Technical Library

D. PERSONNEL

1. Concept of Manning

The design and concept of the SNAP-II System is predicated on the requirement that no additional personnel be required to manage, operate or maintain the system [Ref. 2: p. 1], and that these duties be performed by existing ship-board personnel on a collateral duty basis.

Both Atlantic and Pacific fleet surface Type Commanders have issued instructions [Ref. 11:pp. 3-6], [Ref. 12:Encl. (1) pp. 2-4] delineating specific system responsibilities. Both closely follow the Management Guide issued by NAVMASSO [Ref. 1:pp. 20-24].

The following collateral duty billets are identified:

- System Coordinator
- Assistant System Coordinator
- Functional Area Supervisors
- Hardware Maintainers

2. Specific System Requirements/Assignments

a. System Coordinator

An officer or chief petty officer will be responsible for:

- implementation, operation, and maintenance of the system
- primary point of contact for the ship

- coordinate, monitor, and schedule system usage by Functional Area Supervisors
- perform backup, recovery and update procedures
- system security and integrity of data bases.

b. Functional Area Supervisors (FAS)

Each subsystem implemented on board a ship will have a Functional Area Supervisor. The FAS will be an officer or senior petty officer whose skills and knowledge in that area qualify them for such designation. His responsibilities include:

- ensuring integrity of data base
- ensuring security procedures are followed
- assigning access to personnel
- conducting training for all users
- being responsible for implementing all facets of his functional area

c. Hardware Maintainers

The Hardware Maintainers are rated Electronics or Data Systems Technicians, with two specified per installation. The Hardware Maintainers are responsible to the System Coordinator for the preventive and corrective maintenance on the SNAP-II system.

d. Users

The Managment Guide and Type Commander instructions specify two types of users: journeyman and basic. Basic users will normally only perform data entry and retrieval operations for a specific task within one functional area. Journeymen users have more capabilities in the system, and have the capability to perform multiple tasks within a functional area or can have access to more than one functional area, as designated by the Commanding Officer.

E. TRAINING

1. Concept

SNAP-II training has been conceptualized as a two-phased approach--initial and follow on training, with each of these sub-categorized as to whether it is conducted on board or off-ship [Ref. 13:pp. 146-150]. Table IV illustrates this concept.

The initial training is conducted during the initial implementation of the system on a ship. This is performed by NAVMASSO (Systems Coordinators and on board user training) and by SMA (Maintainers). NAVMASSO will conduct all initial implementation training, whereas maintainers training will transition to FTC Norfolk and FTC San Diego at some point in the future.

Follow on training is to be the responsibility of the Navy training establishment, with 10 (possibly 12) commands identified to conduct this training [Ref. 13:p. 126]. Projected Navy-wide training and education programs will involve the assignment of NEC's to various system personnel, development of PQS and on board training materials for the various functional areas and self-study workbooks [Ref. 13:pp. 160-164].

Follow on training on board ships is a ship responsibility, with training materials to be provided.

TABLE IV
SNAP-II TRAINING

ON SHIP		OFF SHIP
Initial	Implementation training by NAVMASSO	Maintainers (SMA) Ship System Coord- inators (NAVMASSO) PCO/PXO (NAVMASSO)
Follow on	Not specified (ship's responsibility)	Maintainer (May 86 RFT) PCS Pipeline Ship System Coord- inator (TAD/PCS) PCO/PXO (FTC's) 3-M Systems Coord- inator Leading Storekeeper SNAP Admin Mgt Super SWOSCOL for CO/XO/ DH/DO

2. Training

In the initial and follow on training phases, specific formal training courses are provided for the following personnel:

- Systems Coordinator
- Hardware Maintainer
- * - 3-M Coordinator
- * - leading Storekeeper Afloat
- * - SNAP-II Administrative Management Supervisor

* not implemented as of 31 January 1986

Surface Warfare Officers training is to be included as an adjunct to the PCO, PXO, Department Head and Basic courses conducted by SWOS, although this has not formalized and in place as of January 1986. There is no mention of Submarine Officer training. Training for Supply Officers is being conducted at NSCS, Athens, Ga.

Training materials for on board initial and follow on training are prescribed in the Navy Training Plan as well. They include training for Journeyman/Basic User and Functional Area Supervisors for initial training, and the following for follow on training (for each subsystem) [Ref. 13:pp. 163-164]:

- Functional Area Supervisor Trainee Guides
- Journeyman/Basic User Instruction Guides and Trainee Guides
- Self-Study Workbooks

3. Transition

The transition process has experienced some delays. Approval of the Navy Training Plan was dated 1 April 1985, almost two years after the first SNAP-II installation on a ship.

Currently, NAVMASSO is the primary agent for conducting SNAP-II training. In accordance with the Navy Training Plan for SNAP-II [Ref. 13], full transition to follow on training was scheduled for Calendar Year 1986. Some training establishments already have instituted some SNAP-II training (NSCS, Athens; SWOS). The planned "ready for training" dates are contained in the Navy Training Plan [Ref. 13:p. 126]. Various sources have indicated that these dates may not be realistic and may slip.

IV. CASE STUDIES

In order to ascertain the end users views and concerns with the SNAP-II system, six ships were visited and interviews conducted with key personnel. The interviews were both structured and unstructured, depending on the response of the individual interviewed.

A "topdown" concept of interviewing was selected so as to obtain a valid organizational picture. Data entry users were excluded from the interview process because of time and personnel limitations and the narrow view data entry personnel would have of the system. The assumption was that problems or concerns at the lowest level would be evident at the next higher level or levels because of the highly structured organizational hierarchy inherent on a U.S. Navy ship.

Three levels of personnel were interviewed: the command level personnel (Commanding Officer and Executive Officer), Department Heads, and the personnel responsible for actual system operation and maintenance (System Coordinator, Functional Area Supervisors, and Hardware Maintainers).

The results of the various interviews are presented in the following six case studies, or reviews. The comments and observations of the ships personnel are presented without comment from the authors. Summaries and specific commentary are presented in the Chapters following the case reviews.

A. CASE 1

1. Introduction

The SNAP-II system was installed during January of 1984 on this Guided Missile Cruiser homeported on the West Coast. Full transition to SNAP-II occurred in February, just prior to and during the initial at sea period of a major forward deployment to the Western Pacific. Prescribed user training for shipboard personnel was conducted underway while enroute to the first port visit of the deployment.

There was very positive command support during the installation and implementation of the system. Of the data bases (WSF, personnel, CSMP) that were loaded at implementation, various pieces of information were missing, causing some degree of user mistrust at the outset. Subsequently, the ship has experienced a minimum of problems with the system, due to strong user and management involvement and excellent support from NAVMASSO and NAVSEACENPAC.

Figures (1) and (2) in Chapter II delineate the integration of the SNAP-II system operational and maintenance responsibilities within the ships internal organization. A Senior Chief Petty Officer (SKCS) from the Supply Department is assigned as the System Coordinator, with the ship's 3-M Coordinator, a Chief Petty Officer (EMC), as the assistant coordinator. The assistant is also assigned as the Functional Area Supervisor for the MDS subsystem. The same SKCS is also assigned as the Functional Area Supervisor for the SFM

subsystem, with the Supply Officer strongly involved. A first Class Petty Officer (PN1) is the FAS for the ADM subsystem.

Hardware maintenance is performed by Data System Technicians (DS rating), although the administration of the maintenance activities is under the cognizance of the Electronic Technician workcenter. This evolved because the ship's Electronic Technicians (ET rating) originally performed the maintenance, but for various uncited reasons, this responsibility was shifted to the Data System Technicians. The hardware installed is in accordance with the specifications for a ship of her class and size.

Training for users is centrally managed and scheduled through the weekly meeting of the ship's Planning Board for Training. The actual training sessions are conducted by the individual Functional Area Supervisors.

The ship is currently using version 4.00.06 of the SNAP-II software, with version 4.00.07 on board and awaiting installation. SNAP-II is considered an integral part of the internal administration of this ship and is strongly supported and used at all levels of the chain-of-command. It's use is so widespread that system backups are planned carefully and receive high level attention so as not to interfere with the users.

2. Command Perception

The Commanding Officer had been in command for six months at the time of the interview. He had not been aboard during installation and implementation of the system.

The Captain spoke highly of the SNAP-II system and indicated that it was used extensively by all levels in his command. Summarizing his feelings, he stated:

Quick and dirty, I love it. I'm a supporter of SNAP-II and it's used extensively on board the ship for other things . . . sometimes, we get carried away.

The Captain attributed the successful implementation of the system to the talent and dedication of the various users and managers, feeling that a ship without the resources he had probably would not fare as well. Because of the talented people on board, he felt that they were able to do a great deal of learning and experimenting for themselves, which had led to less dependence on formalized training to successfully integrate the system into the ship's routine. The right people with the right attitude was the key to success.

The Captain expressed his views about the impact of the system on his command from several perspectives. One was the proliferation of information available, and the other was the positive effect on the management of his ship.

a. Management

The accuracy and timeliness of reports available from the SNAP-II system was the key ingredient that the Captain felt had contributed in a positive manner to the internal management of his command. He was most enthusiastic about the MDS subsystem and its ability to maintain and provide accurate information about the ship's maintenance

activities through the CSMP (Current Ships Maintenance Project) reports. The savings in man-hours in data-entry and the timeliness of obtaining reports in comparison with the former manual method and dependence on external ADP activities was significant:

The last time I was at sea, you never got it right (the CSMP), because by the time it came back from the Type Commander, a month, 6 weeks had elapsed and you were always behind--you could never pick up the CSMP and say, 'this is IT'.

The Captain felt that the ability of his Department Heads to effectively manage was enhanced because they were able to obtain and rely on information that had not previously been utilized to its full extent. He did not indicate that the style or manner of management had changed, only that previous methods and procedures had been strengthened through the use of SNAP-generated information. As an example, he cited the ease with which the ship had been able to undergo an INSURV inspection (INSURV is the acronym for the Navy Board Of Inspection and Survey, an independent activity that reports to the CNO on the material condition of ships). The ease and accuracy with which material discrepancies had been documented and acted on was a direct result of being able to have an accurate CSMP instantaneously available for management to work with and plan for remedial action.

Although the Captain had a great deal of enthusiasm for the system, he did not have a terminal in his cabin, nor did he want one. He felt that his having one would

border on "micro-managing" his subordinates. If he wanted information about anything, he would do as he had done in the past--summon the person responsible and ask for the information.

b. Proliferation of Information

. . . sometimes we get carried away . . .

In some cases, the Captain felt that he had available too much information; more than he could use. He cited as an example the ship's 8 o'clock reports (reports forwarded to the Commanding Officer by the individual departments about their material condition at 8 PM each day):

. . . in some cases they're giving me more information than I need, but after a while you learn where to look. Some 8 o'clock reports from a department will be four pages long, because they'll have everything there, whereas before we used to say, 'what got broke, what broke today, and what got fixed today.' So, we're adding a summary sheet on top of the whole pile.

3. Middle Level Management and SNAP-II

The term "middle level managers" applies to those officers in charge of the various departments on the ship. Those officers interviewed included the Operations Officer, the Combat Systems Officer, the Supply Officer, and an officer representing the Engineering Officer. The Engineering Officer was not interviewed because he had been on board a relatively short period of time, and the officer designated could provide a better insight with respect to that department.

Of the Department Heads, only the Supply Officer had a background in computer systems, having a B.S. degree in Data Processing. None of them had any prior experience with nor any formal training on the system.

As a group, these officers mirrored the Commanding Officer's opinion that the SNAP-II system was a significant management tool, indicating that they themselves and the personnel in their departments used not only the specific reports the system provided, but were also adapting the word processing system and mail facilities to their personal needs to save time, communicate, and produce their own reports.

The benefits derived from the SNAP-II system were not quantifiable in an objective manner, but subjectively these officers felt that the efficiency of their departments was enhanced. Personnel were spending less time preparing maintenance and supply documents, getting faster responses from the supply system, and in general were more accurate in what data they were entering to the system. Because of the increased accuracy, faster response and the reports available, managers at all levels were able to manage more effectively.

Although these officers did not indicate that SNAP-II has changed their management style, one officer did note that since implementing the system, there has been a proliferation of formal ship's Notices. These Notices gave formal instruction for the conduct of specific ship's evolutions that had in the past been promulgated verbally or through the Plan of the Day, which is a daily schedule of the ship's routine and special events.

As a group, these officers were uniformly pleased with the SNAP-II system, considering it a vast improvement

over the former manual methods. Their enthusiasm, however, did not blind them to problems with the system or improvements they felt should be incorporated. These concerns were in the following areas:

- documentation
- training
- system Improvements

a. Documentation

System documentation was not helpful from the middle-managers point of view, in contrast with little objection or complaint being reported from the personnel who use the system for data entry. Asked whether they found the documentation easy to use and effective in acquainting them with the capabilities of the system, these officers responded negatively across the board.

The main thrust of their complaints was that the documentation did not give them an adequate overview of the system and that it was not written in terms that they could readily understand. As a result of this, they reported that experience was the best teacher--they had to use the system extensively in order to understand and be familiar with the documentation.

b. Training

Training system users is a well coordinated and executed evolution, with the only negative comments directed at the initial implementation training, which had been conducted underway enroute to a major deployment.

Recommendations for follow-on training was the main point that the Department Heads had, as there is presently none available on a formal basis, nor are training aids provided for shipboard use. The following suggestions were provided:

- development of interactive training programs for users
- development of various video-taped training programs
- develop a shipboard training package
- provide a waterfront training program similar to ones that exist for 3-M and Damage Control Petty Officers-- i.e., a short (five days or less) class scheduled and conducted locally

c. System Improvements

The Department Heads expressed ideas on how to improve the system and add new applications. For reasons that were not clear (perhaps not being familiar with the administration of the SNAP-II system), few of these have been formally requested through official channels via the "Change Proposal" mechanism provided for in the Type Commanders directive concerning the administration of the SNAP-II system. Most of the suggestions related to producing formatted reports, such as CASREPS (reports of equipment casualties) and enlisted evaluations, and as such will not be listed here.

4. System Operation and Management

The following personnel are assigned SNAP-II system responsibilities:

- System Coordinator--SKCS (also the SFM FAS)
- Assistant System Coordinator--EMC (Also the MDS FAS)
- ADM FAS--PN1

The choice of these individuals was fortunate--with the exception of the MDS FAS, there was a high degree of computer system knowledge. The SKCS had an Associate Degree in the computing field, and the PNI had nine years experience working with computer systems in various shore duty assignments. None of these individuals had any experience with the SNAP-II system prior to their present tour of duty.

a. Maintenance

Hardware maintenance is performed by Data System Technicians (DS rating), who felt that the training received was good, and that the technical documentation was more than adequate for them to perform their duties.

One concern expressed by the maintainers (and supported by the System Coordinator) was the location of the SNAP-II computer itself. It is located directly over the after engine room and cooling could be a problem. Any disruption of air-conditioning service to the space would mean a rapid rise in the ambient temperature, and it was recommended that an interlock between the computer and the air-conditioning be installed to prevent heating problems and system crashes. In this manner, "graceful" system degradation could occur, giving users ample time to save their files.

Maintaining the system on a collateral duty basis did not present a particular problem in terms of coordination or workload, just in the question of when the maintenance is performed. Because of the heavy use of the system, any

preventive maintenance has to be done after working hours, and often late at night.

b. System Coordinator and SFM FAS

The system coordinator felt that the formal training he received from NAVMASSO was "too fast", indicating that he had barely assimilated system terminology before instruction had moved into the operational aspects of the system. Despite this initial drawback, he had not experienced problems in actually running and managing the system. He felt he had a good understanding of the system and his responsibilities, and he interacted well with all levels of system users and managers within the ship.

The Senior Chief had not experienced any problems with the system documentation, and felt that the SMS subsystem was performing adequately.

In the SFM subsystem, his only recommendation for change was the inclusion of a Storekeeper (SK) training manual. While he considered the documentation adequate for use of data entry personnel, he wanted his people to understand what was happening "inside" the program, and as such needed a good training document to guide him.

Hardware maintenance was considered more than adequate, with no problems reported in scheduling or executing maintenance. As far as the hardware was concerned, the only major issue was the lack of enough user terminals.

The Senior Chief did have ideas on system improvements in the SFM area, although he did not indicate that these ideas had been formally submitted as "change proposals" up the chain-of-command. Most of his recommendations concerned specific details of entering and retrieving individual items of data and formatting, and will not be listed here.

Overall, The Senior Chief was pleased with the system and had nothing but praise or constructive comments to make.

c. Assistant System Coordinator and MDS FAS

Although not having a computer background as the other key personnel in SNAP-II management, the MDS FAS was comfortable in his job and had a good working knowledge of the system and his particular subsystem. He had the most to say about the specific functions of the system during the course of the interviews, perhaps due to his excellent knowledge of the 3-M system and his desire to make the subsystem mirror his capability and knowledge about procedures and requirements in the 3-M system.

In the area of system training, the MDS FAS recommended that formal training be set up for the functional area supervisors. In this manner, they could become the system "experts" prior to assuming the job, instead of having to learn as they went along, and not have to rely on what their predecessors in the job had passed on (or neglected to pass on) in the course of the relieving process.

The Chief was generally pleased with the performance of all aspects of the MDS subsystem, and indicated that the success of the system was partially due to the strong 3-M system that was in place on the ship prior to the implementation of SNAP-II. To this end, he noted that there is no guidance from the 3-M system (Documentation) on the subject of how to integrate the SNAP-II system to it, and that this had caused some minor problems in dealing with the shore maintenance establishment.

Overall, the system documentation was felt to be adequate, with the on-line user "help" feature considered a major contributor to the accuracy achieved by the data entry personnel.

System hardware was considered excellent, with the floppy disks being the only problem area identified. They were considered unreliable to use because of problems in data transfer--sometimes they did, sometimes they didn't--and as such were not used. This problem had been identified to NAVMASSO, but no action had been taken to date.

In summary, the Chief was satisfied with the system, although he had pointed out various instances of software "bugs". He felt that the system had been integrated successfully into the ship's routine and that it was being used to its full extent.

d. ADM FAS

Despite a slow start in system use after implementation because of slow response times and problems

with the personnel data base, the ADM FAS rated the system as "good", and would like to see new additions to the program, such as the ability to generate enlisted evaluations. He reported that the "query" function of the subsystem was used extensively, and that the personnel that worked for him were using the system in a satisfactory manner.

System documentation was not an issue, as the personnel using the ADM subsystem relied heavily on the on-line "help" feature to guide them in lieu of using any written documentation. The initial training of personnel was not an issue, nor was the subject of ongoing training.

Training for the FAS himself was the major issue he raised, indicating a need for formal training before assuming the job. This would ensure a proper "turnover" when one person relieved another on the job, and insure a continuity of knowledge and adequate leadership and management.

B. CASE 2

1. Introduction

The SNAP-II system was installed in two phases on this Guided Missile Cruiser homeported on the West Coast. Normally, installation is scheduled for a single time frame, but in this instance it was split. This was due to the ship's desire to accelerate the process in anticipation of the upcoming operational schedule, which would have otherwise dictated the installation at a much later point in time.

With the concurrence of the Type Commander and the SNAP-II project manager, the initial hardware installation was performed in December of 1983 while the ship was nearing the completion of a regularly scheduled overhaul. Because of the accelerated installation and due to the unavailability of resources, only seven of 14 user terminals were installed.

After completion of the first phase of installation, the ship's manual records and documents were converted to electronic media, and version 2.0 of the application software was installed, with the system becoming operational in March of 1984. There were no major problems associated with the records conversion, although the conversion of COSAL records was incomplete, possibly due to the fact that the SOAP team validation of the existing COSAL had not been completed. Some initial training delays were experienced because of the lack of enough terminals and an insufficient amount of system documentation manuals (only two user manuals available vice one for each terminal).

The second phase of hardware installation was planned for a period of three weeks during August/September 1984, with an upgrade to version 4.0 of the software scheduled for the same period. This work fell behind schedule by several weeks, requiring the ship to put to sea on routine operations with a "down" SNAP-II system. This disrupted the ship's ability to process standard maintenance and supply documents, of which they had now come to depend for entirely on the SNAP-II system.

At the time of the interview, the ship had the standard SNAP-II hardware configuration for a ship of her class and size, and had version 4.00.07 of the software installed.

The attitude prevalent in the ship throughout the installation and implementation phase was positive; the command had been insistent on doing things right the first time. Since coming on line, the ship has experienced few problems with either the software or hardware. This system is considered to be very rugged and reliable, with satisfactory results being achieved.

Figures (1) and (2) in Chapter II delineate the integration of the SNAP-II system operational and maintenance responsibilities within the ship's internal organization. The Assistant Supply Officer has been designated as the System Coordinator, with a Chief Petty Officer from the Supply Department (an SKC) assigned as his assistant. Maintenance on the hardware is performed by a Data Systems Technician (DS), who is normally responsible for the operation and maintenance of the ships NTDS computers, and a Postal Clerk (PC). The Functional Area Supervisors are assigned in accordance with the directives of the Type Commander, Commander Naval Surface Forces, Pacific Fleet (COMNAVSURFPAC) [Ref. 12:Encl. (1), pp. 2-4].

SNAP-II appears to be successfully implemented in this ship, although not all facets of each subsystem are

being fully utilized. The system is well accepted throughout the ship, and has apparently not caused any radical changes in the way the ship manages or conducts its business. To date, there has been no effort to write individual software programs using the system's BASIC language programming capability, partly due to the perception that the system is already heavily loaded, and due to a lack of BASIC language documentation and training.

There is no formal training program in place to teach system familiarization or utilization. Rather, the individual subsystem Functional Area Supervisors conduct training on an "as needed" basis and provide basic introductory sessions with newly-reported personnel who will be using that particular subsystem.

2. Command Perception

The Commanding Officer had been in command for 18 months at the time of the interview, and had not been on board during the initial SNAP-II hardware installation in the shipyard. His personal involvement and use of the SNAP-II system at the time was limited to using the MUSE word processing subsystem on the terminal in his cabin. Overall, he regarded the system, per se, as a very capable one for the functions it was performing, but felt that it could be improved in several respects. His basic expectation of the personnel using the system was not in the form of increased output, but of increased efficiency and accuracy. The end

result, he had found, was that people were not more efficient, but were merely doing business in another way.

In contrast to the Commanding Officer, the Executive Officer had no comments to make about the SNAP-II system. Although he had a terminal in his stateroom, he did not make regular use of the system.

The Captain had a limited exposure to computer systems through various academic courses, and stated:

. . . I know what a computer ought to do for me, but I am not a computer 'buff'.

The major issues that were raised during the interview were not centered on specific aspects or attributes of the SNAP-II applications and systems software or hardware, but rather on broader aspects, such as documentation, security, and the effect of SNAP-II on the internal management of the ship.

a. Security

Regarding the issue of security of the system, the Captain was particularly apprehensive about the planned conversion of disbursing records to the Supply and Financial Subsystem of SNAP-II. His concern was that records would be accessible to unauthorized personnel, even though the system is protected by a system of individual access controls to the various subsystems through use of passwords. Concern was expressed about the manipulation of records, not the actual theft of cash.

In the Captain's opinion, any system with a central repository of records, such as the memory disks of the SNAP-II system, was susceptible to access despite any and all efforts to impose administrative controls. What was needed, he thought, was a stand-alone computer where the physical control of the disk could be guaranteed--i.e., the disk could be locked up when not in use. He did not feel that the present security arrangements of the SNAP-II system were sufficient to guarantee that no unauthorized access could take place.

b. Documentation

The basic question raised by the Commanding Officer was, who was the system documentation aimed at. His perception was that it was written for people who understood computers to start with, and was not aimed at the manager's viewpoint. His personal experience on the system was that he was learning from other people, not from the documentation available. Describing the current documentation as a "cookbook" for a user, he did not feel that it answered the basic questions as to what the system could do for him in his position as the Commanding Officer of the ship:

How can the Commanding Officer of a ship with 'x' number of Department Heads use it? . . . There is a difference between button pushers and managers, and managers don't understand the system well enough to know what the system can do for them.

From this perspective, the Captain felt that in addition to the "pushbutton" approach to documentation, a

"level-by-level" approach was required so that different levels of system users would be given different views and documentation on the system. By the "level-by-level" method, he meant that Department Heads, Division Officers, and command-level personnel (CO/XO) have different needs for different kinds of information, and that a manual describing the system from those reference points was needed. The "cook-book" approach only allowed him to look through documentation to find specific screens, but information on the whole issue of CSMP management or financial reporting for instance, was not available.

Summarizing, he felt that to those people with a limited or non-existent knowledge of computers, SNAP-II failed miserably in its documentation:

I MIGHT be able to get a hold of the information I need, but I DEFY anybody to go into the documentation and figure it out.

c. SNAP-II and Management

The SNAP-II system has caused the Commanding Officer to question the applications and usefulness of the system in two areas: whether it was a useful tool from a management oversight perspective, and whether or not the impact of the system on the efficiency of mid-level management (such as Department Heads and Division Officers) was a positive one or not.

Explaining that a Commanding Officer had different requirements for information from the system than that of

others in the chain-of-command, the Captain felt that he could not obtain information of an analytical or aggregate nature from the SNAP-II system. What was needed, he felt, was number data about what was going on internally in his command--how many requisitions were backlogged; what is the spending trend of the ship? A particular department? A division?:

Many of the things I ask, the guy has got to go back to the manual thing to provide the answer.

The Captain did not feel that the system was "management friendly", and that it could not provide the information he needed. While he would have liked many things from the system, he did find that at the lowest levels, that is, the level of people who had to use the system to carry out their everyday jobs, the system provided neatness and did lead to increased accuracy:

If it was not intended for management oversight, its doing its job . . . from a management viewpoint, I am not finding it useful.

Regarding the net effect caused by the introduction of the SNAP-II system on the efficiency of management in his command, the Captain felt that there were basically two effects--one positive, one negative--and that only time and experience with the system would yield a clearcut answer.

The negative aspect was that officers were forced to sit down at a specific location (a computer terminal) to review and approve/disapprove supply requisitions or

maintenance action documents. The biggest problem was getting people to routinely sit down at a terminal and review the items awaiting their action. This was detrimental in several ways:

- The officers are not provided with their own terminals, and must use terminals that are in use by the data-entry personnel, often "bumping" them. This delays either a user or an approver, and the work at hand is delayed.
- Officers are engaged in a variety of tasks; management by walking around and inspecting is common. The end result is that an officer is "out and about" most of his working day (not to mention watch standing), and in the past, personnel could "walk through" important paperwork simply by approaching the officer anywhere on the ship, and he could approve/disapprove the item. This personal contact afforded the time and place for pointed questions about what was going on; with SNAP-II, this contact is lost and action might be delayed.

On the positive side, the Captain pointed out that once an officer approved an item, it was instantly entered into the system: maintenance actions were on the CSMP and supply requisitions were in the queue for Supply Department action. This guaranteed that the CSMP was instantly updated and correct (a rarity in the past), and that requisitions could be tracked and acted on with precision. The internal efficiencies of this were difficult to measure against the external inefficiencies cited previously.

3. Middle Level Management and SNAP-II

The term "middle level management" applies to those officers next in the chain-of-command under the Commanding and Executive Officers. In this specific case, those interviewed were the Operations Officer, the Weapons Officer,

and the acting Supply Officer. The Chief Engineer was not available. All are "Department Heads", in charge of a major administrative group within the ship.

As a group, these managers had little or no exposure to computers or computer systems prior to their current situation. The only formal training afforded them had either been conducted on board by NAVMASSO DETPAC during the implementation phase, or during introductory sessions on SNAP-II conducted at shore-side schools while they were enroute to the fleet. As discussed previously, the training during the implementation phase had been less than ideal because of the shortage of terminals.

In contrast with the Commanding Officer, who viewed the SNAP-II system from a broader and more generalized perspective, this group of officers viewed the system with specific items in mind and without a total system perspective. There was also a distinct difference in perspective and use of the system between line officers and the Supply Officer, perhaps due to the fact that the Supply Officer's "bread and butter" is tied directly to the SNAP-II system--he MUST use it to perform almost all aspects of his job, while this is not true of the line Department Heads.

a. Line Management

The line middle level managers (Department Heads) have not made extensive use of the SNAP-II system beyond those activities for which there is no alternative--approving/disapproving supply requisitions and maintenance action

documents. Word processing has been used, but not extensively.

The reasons cited for this were:

- lack of formal training
- lack of time for training after arrival on board
- lack of terminal availability on board

However, on the two subsystems that had to be used (MDS and SFM), the Department Heads were pleased with the results and felt that their personnel were more accurate in their paperwork and tended to perform paperwork that in the past had not always been accomplished, such as deferred maintenance actions and changes to equipment configuration (CK's). They were not able to quantify increased productivity in their departments as a result of the SNAP-II implementation.

There was mixed response to the question of system documentation (user manual) adequacy, ranging from "good" to "poor". In general, they thought that their people had been adequately trained to use the system for the basic functions such as maintenance action reporting and generating requisitions.

b. The Supply Department

Overall, the opinion of the acting Supply Officer was that SNAP-II was a "great" management tool, providing for increased accuracy in financial reports and streamlining the processing of supply requisitions. Not all of the SFM functions were being utilized to one degree or another; for example, the SFOEDL and BOR routines had not been employed for several reasons:

- lack of understanding
- time consuming to use
- inability to change output (Budget OPTAR Report--"BOR")

(BOR is a report that is cumulative in nature and only "seen" at the end of a reporting period--any changes or corrections require complete reconstruction.)

Duplication was also occurring in several areas due to problems in program logic and lack of understanding and trust on the part of users and management. For example, the internal financial budget report was also being kept manually because requisitions in "queue" to the Supply Department, although not yet approved by an authorized person, were being subtracted from the ship's budget, causing an erroneous listing of the current budget balance.

It was not felt that training on the system was a problem for the users--the Supply Department conducted their own training for the users and considered them adequately knowledgeable in supply procedures to be able to effectively use the SNAP-II system.

In summary, the acting Supply Officer considered that his department was coping very well with the SNAP-II system, although there were minor problems with it and the system was not being employed to the fullest extent possible. The apparent attitude was that in time, as people gain more experience with the system and as the system itself becomes more refined, greater use would be made of it.

4. System Operation and Maintenance

The Assistant Supply Officer is designated as the System Coordinator, with a Chief Petty Officer from the Supply Department as the Assistant System Coordinator. The Assistant Supply Officer is also the Supply and Financial Management subsystem Functional Area Supervisor (FAS). The other Functional Area Supervisors are as follows:

- MDS--3-M Coordinator (MMCM)
- ADM--Chief Petty Officer (PNC)

a. Hardware

Hardware maintenance is performed primarily by a Data Systems Technician (DS rating), as explained previously, with a Postal Clerk (PC rating) as his assistant. The training received by the maintainers was considered adequate, as is the technical documentation that they use to carry out the maintenance.

As the duties of the maintainers are collateral in nature vice a primary duty, the maintainers did feel that it interfered with their primary duties, although the amount of interference was not quantifiable or verifiable with the System Coordinator. The scope and depth of the preventive maintenance performed was considered to be adequate.

b. System Coordinator and SMS FAS

The System Coordinator rated the training he received from NAVMASSO DETPAC as good, and felt that he could

provide adequate training to his relief. Managing the system with a group of people on a collateral duty basis was not a particular problem. As the System Coordinator, the Assistant Supply Officer spent about an hour to an hour and a half each day taking care of routine and emergent system-related jobs, such as conducting backups, clearing system problems, and routine administration. He did not feel that this detracted from his primary duties, but he did feel that the System Coordinator's workload would increase in the future as people became more familiar with the system and made more extensive use of it.

Maintenance and operation of system hardware was not a particular problem, and it was felt that the performance of the System Management Subsystem (SMS) was good. The support provided by NAVMASSO DETPAC and NAVSEACENPAC was considered to be very good.

As the System Coordinator, the Assistant Supply Officer was not directly involved in the training or indoctrination of new users. That function was left to the individual Functional Area Supervisors and the departments concerned. He did feel that the initial training provided by NAVMASSO DETPAC could have been more in-depth, although the lack of terminals could have had a bearing on that.

His interactions with the various personnel associated with the system, from the CO/XO down to the

everyday user, ranged from "not much" to "little or none", respectively. Most of the system administration and problem solving was delegated to the Functional Area Supervisors.

c. Functional Area Supervisors

(1) SFM FAS. The Functional Area Supervisor for the Supply and Financial Management module is the Assistant Supply Officer, and as such, his views will not be repeated here as they have been covered previously under the Supply Officer section and the System Coordinator section.

(2) MDS FAS. The Functional Area Supervisor for the Maintenance Data Subsystem is the ship's 3-M Coordinator, a Master Chief Machinist's Mate (MMCM). The MDS subsystem is perhaps unique when compared with the other subsystems in that every work center on the ship is actively involved in data entry and retrieval from it. Because of this, the MDS FAS is concerned with input quality and training on a ship-wide basis.

On the subject of training, the Master Chief indicated that he was still in the learning process and that he was not yet completely familiar with all the facets and components of his subsystem. All of his training as the MDS FAS had come from the person he had relieved, and, although he regarded the system as "simple", he would not mind having some formal schooling on the SNAP-II system.

As far as training personnel who use the MDS subsystem, there was no formalized training instituted.

Rather, training was conducted on a "one on one" basis for new personnel and others, as required, by the Master Chief. Insofar as improvements in the training methodology, the Master Chief felt that the addition of some form of "programmed instruction" on an interactive basis on the computer terminals would be helpful, as would be video-taped programs that could be played over the ship's closed circuit television system.

In the area of system administration, both internal and external to the ship, all questions or suggestions were forwarded to the System Coordinator for resolution. As such the Master Chief reported little or no contact was made with outside activities for clarifying procedures or to make suggestions for system improvements.

Rating the documentation for his subsystem as adequate, the Master Chief felt that MDS was the best subsystem within SNAP-II, and that he and the personnel actually using the subsystem for data entry were pleased with the results they were obtaining from the system.

(2) ADM FAS. The Administrative Data Management subsystem (ADM) FAS, a Chief Petty Officer (PNC), regarded the system as a time saving device that was tailored to his needs. He reported no particular problem in any area of his subsystem, and was completely satisfied with what he was using. He had no recommendations for changes.

C. CASE 3

1. Introduction

One of the first ships to receive SNAP-II, this East Coast destroyer (DD) suffered as a result of a rushed installation and implementation in January 1985. The ship received the standard SNAP-II equipment configuration for a ship of her class and size with implementation training conducted in January 1985 by NAVMASSO. The SNAP-II system was installed just prior to deployment and the training was conducted during the transit overseas. The reason for the rushed installation was not known to current ship's company. As a result of the rushed installation, the conversion from manual to mechanized records was less than optimal. Problems arose as the result of the ship's inaccurate input to the databases (supply, maintenance, and administration) and from hurried processing and inadequate quality assurance on part of the contractor (SMA) and the Navy shore establishment.

The implementation training received from NAVMASSO was not very effective, due to the preoccupation of shipboard personnel with operational and deployment evolutions. The system documentation was not able to fill the gap left by the inadequate implementation training.

Figures (1) and (2) in Chapter II delineate the standard organization of a surface combatant after implementation of SNAP-II. The 3-M Coordinator has been designated as the System Coordinator, with an Electronics

Technician First Class assigned as his assistant. Maintenance on the equipment was performed by Data Systems Technicians (DS). The Functional Area Supervisors were assigned in accordance with the directive's of the Type Commander, Commander, Naval Surface Forces, U.S. Atlantic Fleet (COMNAVSURFLANT) [Ref. 11:p. 4].

The ship has experienced a variety of problems with the software. The most severe software problems stemmed from the rushed implementation and the remainder of the software problems could be characterized as growing pains. The Supply data base (inventory stock records), maintenance data base (CSMP), and the Administration data base (personnel data) all suffered integrity problems. The source of the problems could not be directly linked to any specific action but the end result was a lowering of the creditability of the system and a reluctance on the part of the users to utilize the system. This, coupled with a significant amount of downtime (five weeks) caused by equipment failure (power supply failed) and a software problem (loading updates), resulted in slowing down the process of bringing the system fully in line.

The ship's personnel have finally accepted the SNAP-II system and have put forth an effort to utilize it. The SNAP-II system was recognized as a better way of performing day-to-day functions. All the functions were not yet on line but the ship was heading in that direction. The functional

area programs were just starting to be utilized for management of resources beyond what was required by the system. As an overall management tool, the word processing function was the most productively utilized. The BASIC language was not being used for programming due to lack of programming experience, the delayed acceptance, and the poor documentation.

The training program consists of on-the-job training within the functional areas and training of reliefs by the incumbent. The command does not have a formal training program or indoctrination program for newly transferred personnel. The ship does not have an instruction for the use and management of the SNAP-II system.

2. Command Perception

The Commanding Officer was a surface line Commander with previous experience on a SNAP-II ship as the Executive Officer. He was not on board during the installation and implementation on this ship. The Commanding Officer did not personally use the system, but a growing proportion of the administrative workload in the ship was being produced with the system's word processing function. He was interested in learning to use the system, but he has not received any training, and competing operational priorities override his desire to learn. The training by NAVMASSO was "implemented from the grass roots up and did not reach his level". He felt the system was a "good thing and the thing of the

future", but as with any new system, it has its share of "growing pains". He felt his personnel were using the system and learning to use it effectively.

The Commanding Officer was not aware of the management capabilities that the system afforded and did not view it as an important management tool at the command level. Over the next several years, he felt Commanding Officers and Executive Officers would experience an "education/training gap" in the management of the SNAP-II system, until the current department heads with knowledge of SNAP-II were promoted to the CO/XO level.

The Commanding Officer felt he should not have to be involved in the management of the SNAP-II system unless there were major problems, and felt that the system did not need his guidance or support to achieve acceptable performance. He devotes his "time to trouble spots and where he can make the most money".

3. Middle Level Management and SNAP-II

The middle level management, for the purposes of this review of the SNAP-II system, consists of the Department Heads. On board this ship, those interviewed included the Combat Systems Officer, the Operations Officer, the Engineering Officer and the Supply Officer. The Engineering Officer was the only officer without computer training or experience prior to this billet. The Combat Systems Officer (CSO) and the Operations Officer (OPS) had taken courses in

college, and the Supply Officer had prior experience with the Navy's Uniform Automated Data Processing System (UADPS). None of these officers had training or experience with the SNAP-II system prior to their current billet.

These officers viewed the SNAP-II system as indispensable, even though it has had numerous problems. As the Combat Systems Officer stated, "it was better than not having it on board". The supply and maintenance programs were perceived as the most needed, but these officers were most dependent on the word processing function. As a group, they do not utilize the system as a management tool for planning reviewing the operation of their administrative functions. The exception to this was the Supply Officer, because of his being more dependent on the SNAP-II system in the management of his department--"As SNAP-II goes, so goes the Supply Department." All these Department Heads use the system to perform routine administrative actions within their functions (e.g., approving NAVSUP 1250's or OPNAV 4790/2K's) and for word processing. Despite the absence of support from the Commanding Officer and Executive Officer, they regard the system as capable and expect it to help improve effectiveness and accuracy. As the Engineering Department Head stated, it was a "better way of doing the same thing."

As indicated by their responses, the Department Heads do not consider the SNAP-II system as a management tool. Although their responses to the interview questions consisted

mainly of complaints evolving around day-to-day functioning of the programs, the following management issues were raised:

- Lack of adequate documentation
- Lack of adequate number of terminals
- Lack of communication
- Inadequate knowledge of how to utilize the system for management of their functions
- Functional area management problems

a. Lack of Adequate Documentation

The middle level managers found the documentation to be inadequate for training new users and of only limited use in answering questions or solving problems. They felt the manuals were "written for computer literate" personnel and not for the novices that make up the majority of the users. None of the officers interviewed used the documentation because they regarded it as being too hard to understand and difficult to use. They rely on their personnel to have the requisite knowledge, and more times than not their questions go unanswered.

The documentation did not provide the inter-relationships of the various data bases or programs, or flow of data through the maintenance and supply subsystems. A management summary that could provide an overview of the system as a whole was cited as a requirement so as to allow the Department Heads to effectively utilize the system to manage their departmental functions.

b. Lack of Adequate Number of Terminals

The middle level managers felt that the number of terminals needed to be increased. This would reduce the wasted

man-hours they and their personnel spend searching for an open terminal or waiting in line to use one. An increase in terminals would allow more work to be accomplished during the workday when supervisors were present. The problem was partially caused by terminals installed in limited access spaces, in spaces that were not near the person's work area, and by inadequate management of the utilization of terminals. They felt that the main reason the problem existed was due to a lack of understanding by the shore establishment of the environment the afloat personnel operate in. A significant number of documents (supply and maintenance) require actions to be taken at other than the time the officer was at a terminal. This required the officer to stop what he was doing, hunt down a terminal, and bump someone else off the terminal or stand in line. The alternative was to put the document on hold or to create a walk through document, both of which have significant repercussions.

c. Lack of Communication

The Department Heads felt they operated in a void. They had little or no knowledge of the SNAP-II program as it existed outside of their ship. They desired to see more information on the direction the SNAP-II program was heading and what were the major problems the system was experiencing. The publications that did exist were inadequate in their coverage of problems being experienced by other users. They wanted to see the solutions to problems experienced by other

users. They wanted to see the solutions to problems experienced by other ships or something to indicate that action was being taken on problems, and if there were any interim procedures that could be employed.

d. Inadequate Knowledge to Effectively Utilize the System for Management of Functions

As mentioned previously, there was no system overview or management guidelines showing how to utilize the system to better manage their functions. The Department Head's perception was that no thought was given as to how these programs affect the management of a department or how the computer could be used to improve management of shipboard resources. The Supply Officer felt the computer was being used as a "transaction processing" system and should be better developed as a management information system. They had to grope along without direction and had experienced a needless waste of man-hours to gain a workable knowledge of their role as users and, more importantly, as managers.

e. Functional Area Management Problems

The Supply Officer felt that one of the more difficult problems encountered during the implementation was the lack of functional area knowledge of his personnel. He was concerned about the knowledge of the personnel he received from "A" School and those personnel transferred from other commands. The storekeepers had to be taught basic storekeeping before they could perform functions utilizing SNAP-II programs.

The maintenance personnel had the same problem in regard to preparing the documentation for maintenance actions.

The Supply Officer and Engineering Officer noted that they had been hampered by the lack of guidance from the functional area managers (NAVSUP and NAVSEA). The supply, 3-M and maintenance manuals did not reflect the policy, guidance or procedures to be utilized by shipboard personnel in processing supply and maintenance actions with the SNAP-II system.

4. System Operation and Maintenance

The 3-M Coordinator was designated as the SNAP-II System Coordinator, with an Electronic Technician First Class as the Assistant System Coordinator. The Functional Area Supervisors were as follows:

- MDS--3-M Coordinator (EMC)
- SFM--Senior Chief Petty Officer (SKCS)
- ADM--Chief Petty Officer (YNC)

Hardware maintenance was performed by Data System Technicians (DS). The documentation and training they received was considered adequate. The hardware maintainers were concerned about this function taking them away from their primary responsibilities, but they have had no significant problems with meeting both requirements. The preventive maintenance was considered adequate.

a. System Coordinator

The System Coordinator did not attend the NAVMASSO training due to deployment and the systems manuals did not

provide him with the basis for learning the responsibilities of the System Coordinator. He felt he could not adequately train a replacement and felt it essential that his relief have both the 3-M and System Coordinator school prior to reporting on board. The System Coordinator felt that utilizing collateral duty personnel to run and maintain the system was working well.

SNAP-II Version 4.00.07 of the software had recently been installed. The performance of System Management Subsystem (SMS) was considered good, with the support received from NAVMASSO and NAVSEACEN considered as outstanding.

b. Functional Area Supervisors

The Functional Area Supervisors shared the same concerns as the middle level managers about training. The primary problems in the training area were:

- poor implementation training
- lack of functional knowledge
- no formal training program on board

The documentation was rated inadequate for training and from poor to acceptable for problem solving/information gathering. They felt that a "cookbook approach" to writing the manuals was needed. The lack of guidance from Functional Area Managers (NAVSUP and NAVSEA) was cited as making day-to-day solving of problems more difficult.

The MDS and SFM Functional Area Supervisors felt their programs were very good. They reduced errors and made the processing of data more accurate but they did not see a reduction in man-hours expended. The man-hours were shifted

to other functions or consumed by performing revised procedures. The supervisors were divided over whether SNAP-II increased productivity.

The ADM supervisor felt the program was not a time saver for either the yeomen or personnelmen, but the system produced more accurate output (shipboard bills, personal data, career counselor information, etc.) and the output was easier to update. The increase in accurate output was offset by increased workload due to an increase in requests for outputs and less tolerance for inaccurate or untimely output. The ADM supervisor was particularly vehement in emphasizing that the system was too slow for any of the yeomen's work to be performed with SNAP-II.

D. CASE 4

1. Introduction

The SNAP-II system was installed on board this Frigate (FF) while the ship was nearing the completion of a regularly scheduled overhaul (May 1984-January 1985). Without the ship's foreknowledge, COMNAVSURFPAC and NAVSEA decided to accelerate the ship's SNAP-II installation. The ship, homeported on the West Coast, was only given one week's notice prior to the installation. The ship received the standard SNAP-II hardware configuration for a ship of her class. At the time of the interview, version 4.00.07 of the software was being installed. The implementation and training were conducted in February 1985

by NAVMASSO DETPAC. The records conversion and loading of databases were accomplished without significant problems.

Figures (1) and (2) in Chapter II delineate the ship-board organization after implementation of SNAP-II. The 3-M Coordinator had been designated as the System Coordinator, with an Electronics Technician Chief Petty Officer assigned as his assistant. Maintenance on the equipment was performed by Electronics Technicians (ET). The Functional Area Supervisors were assigned in accordance with the directive's of the Type Commander, Commander Naval Surface Forces, Pacific Fleet (COMNAVSURFPAC) [Ref. 12:p. 4].

The ship had experienced only minor hardware problems, and had one Casualty Report (CASREP) as a result of a software failure, in which the system locked out all users. The casualty was corrected with guidance given by NAVMASSO DETPAC via message traffic. The support provided by NAVMASSO DETPAC and NAVSEA NAVSEACENPAC had been outstanding.

The SNAP-II system was not fully implemented on board and the ship had experienced a significant amount of "growing pains" during the transition process. A highlight to the process was the ship's effective use of word processing. For this ship, the word processing program was the strongest management tool in the SNAP-II system. The ship's personnel had made no attempt to write software programs using the BASIC language provided with the system. This was due, in part, to the lack of adequate documentation and training.

The ship rated the SNAP-II system "very good" as a Transaction Processing System. They were impressed with the capability of the supply and maintenance functional area sub-systems. Though there were problems, the system was seen as having great potential and was highly regarded for its role in improving accuracy and timeliness of data.

The training program consists of on-the-job training within the functional areas and training of reliefs by the incumbent. The command does not have a formal training program or indoctrination program for newly transferred personnel and ship does not have an instruction for the use and management of the SNAP-II system.

2. Command Perception

The Commanding Officer had been in command for 16 months at the time of the interview and had been on board during the installation and implementation of the system. He "likes the idea of SNAP-II" and "likes what is there," and regarded it as particularly useful in the material management arena. "The improvement in the quality of the Ship's Force Work List (SFWL) and Current Ships Maintenance Project (CSMP) was impressive." SNAP-II had "really cut down on the delays" in preparation of work packages resulting in "immensely increased validity." The SFM subsystem had "bugs in the programs" and they had to "maintain dual systems." The SFM subsystem has proved its value in the processing of routine paperwork and creating reports. In the personnel area, "it (SNAP-II) would be useful,

except I lack (an adequate number of) personnel" to maintain the data base.

Personnel related issues dominated the interviews but he felt they were "only part of a bigger problem." The Commanding Officer put it this way:

The problem is that a ship is tasked to do so many things but the number of people never change. Now I've got a new computer system with new maintenance and administrative requirements. I've got to take care of SNAP-II, but I didn't receive additional personnel. It's typical of the way we do business. We add, add, add... Nobody takes anything away. Then CNO or SECNAV come out with an administration reduction program, listing pages of message reports that were deleted, but ship's were not making those reports.

The Commanding Officer thought SNAP-II was a good system, but a computer system is made up of more than hardware and software. The Commanding Officer, summarizing how he felt, stated:

Where you have good people, SNAP-II performs good because your people make it work. Where your people are weak, SNAP-II is no better than they are.

3. Middle Level Management and SNAP-II

The middle level management consists of the officers in charge of departments. Those interviewed were the Supply Officer, the Operations Officer, and the Engineering Officer. The Administrative Officer, although not a department head, was also interviewed. The Administrative Officer and the Engineering Officer did not have training or experience in computer operations prior to their current billets. The Operations Officer had some computer courses in college but did not have practical experience. The Supply Officer was in

one of the first groups of Supply officers to receive the SNAP-II training offered at Navy Supply Corps School for officers going to sea billets. Also, he had been on board a destroyer with a Wang VS-80 minicomputer.

The Department Heads felt the system did not have command level support. This hindered the ship in fully implementing all the subsystems and had reduced the drive to "push the system to its maximum."

The Department Heads had high expectations of the system, and SNAP-II more than lived up to them. The system brings a welcomed reduction in the overburdening process of handling paperwork. As the Operations Officer stated, "the system was needed and now I do not want to do without it." The Department Heads discussed the "management tools" the system provides for coping with the day-to-day workload. The most discussed were the approval processes for supply material requests and work requests, and a variety of word processing applications. The word processing was the only program that was used for management beyond the day-to-day processing of transactions and required reports.

a. Training

The implementation training by NAVMASSO DETPAC thought the necessary knowledge to the ship to make the SNAP-II system operational. However, the training was lacking from the management perspective. It did not provide the Department Heads with the necessary instruments to manage

their functional areas. As the Engineering Officer remarked, "I was given a tool and no instructions on how to use it." The Department Heads as a group could not perceive what the system could do for them as managers, beyond mechanizing the manual procedures. Having attended SNAP-II training and due to the deep personal involvement with the SFM subsystem, the Supply Officer did have a clearer understanding of the management capabilities of SNAP-II. This made it clear to him that the system was not "designed with the management aspect in mind."

The Operations Officer and the Supply Officer desired to see off-ship training expanded rapidly. They were most concerned about having training for officers, Functional Area Supervisors and the System Coordinator prior to reporting on board. They stressed the management aspects for officers and for the Functional Area Supervisors.

b. Dependency on the System

The department heads expressed concern over the dependency on the SNAP-II system. It seemed to them that the shipboard supply and maintenance, and to a lesser extent the administrative system, were heading toward total dependency on SNAP-II. The Supply Officer did not feel that the long-term effect of SNAP-II on the ship had been adequately studied. He was concerned about the effect of downtime on the operation and how he would process a sizable backlog with existing resources. The Operations Officer wanted a backup capability

(redundancy) in the equipment to avoid the possible effects of downtime.

c. Lack of Adequate Number of Terminals

The Department Heads were troubled by the problem of access to terminals. They felt that too much time was being spent trying to find an open terminal or waiting in line to use terminals. This had a greater affect on the enlisted personnel than on the officers. The enlisted personnel mainly use terminals for work that must be done. The officers usage is more discretionary. The system would be used more frequently by officers if they had more convenient access to terminals. Though the Supply and Engineering Officers talked of using terminals for MDS and SFM subsystem management, the Department Heads were stressing the use of the word processing function. The suggestion was that greater benefit may be obtained from expanding the word processing capability than by increasing the management information and decision support capabilities of the system.

4. System Operation and Maintenance

The 3-M Coordinator was designated as the SNAP-II System Coordinator, with an Electronic Technician Chief Petty Officer as the Assistant System Coordinator. The Functional Area Supervisors were as follows:

- MDS--3-M Coordinator
- SFM--Senior Chief Petty Officer (SKCS)
- ADM--Chief Petty Officer (YNC)

Hardware maintenance was performed by Electronic Technicians (ET). The training received from SMA was considered outstanding. The hardware maintainers felt that the diagnostic tape and maintenance manuals were very good and spoke highly of the system. One of the maintainers commented, "the system is very reliable." They spoke very highly of the support received from NAVSEACENPAC.

a. System Coordinator

The System Coordinator rated the training he received from NAVMASSO DETPAC as adequate but too limited in scope and time frame. He felt he needed more training because of his lack of previous computer experience. The COMNAVSURFPAC directives proved helpful in grasping the full extent of his responsibilities. The System Coordinator thought that his relief had to have training prior to reporting to the ship, and that the Functional Areas needed to have packaged training for use on board the ship. The implementation training the ship received from NAVMASSO DETPAC was rated as adequate, and software support received was considered "very responsive".

The System Coordinator and the hardware maintainers expressed a desire to have the policy of replacement vice repair modified. They had had problems with circuit boards and printers that they felt they should have had the capability to repair on board but had to be shipped to a central repair facility. The ship had been without one of their printers for several months with problems that they probably could have

corrected, given the proper tools (repair parts, technical manuals, training).

b. Functional Area Supervisors

The Functional Area Supervisors shared concerns about training. The problems cited were:

- implementation training lacking depth
- no formal training program on board
- no packaged functional area training for supervisor
- personnel lacked adequate functional area knowledge
- lack of off-ship functional area training

The Functional Area Supervisors felt they were impeded by the lack of guidance on how to handle problems. They cited the Naval Supply Systems manuals and the 3-M manuals as not having mechanized procedures or guidance on how to utilize SNAP-II within those functional areas. The Type Commanders have provided the only operational guidance that the ship had recieved.

The Functional Area Supervisors for MDS and SFM were very positive about the usefulness and the ability of subsystems to save time. The MDS subsystem made maintenance management "so much easier and much more accurate". The SFM Functional Area Supervisor stated, "the system is good but it will be fantastic when the bugs are worked out".

E. CASE 5

1. Introduction

This Spruance-class destroyer, homeported in Norfolk, Virginia, commenced installation of SNAP-II in October 1983.

By January 1984, it had completed installation and implementation of the system. This ship has the standard SNAP-II hardware equipment configuration for a ship of her class and size. Version 4.00.07 of the software is installed.

The initial installation of the hardware by SMA and the implementation of the software package by NAVMASSO was completed with only minor problems. The conversion of stock records, outstanding requisitions, CSMP, and COSAL to the SNAP-II system contained numerous errors. The faults were later determined not to have resulted from the conversion process itself, but rather as a result of incomplete original records. The COSAL is still not complete.

The internal SNAP-II organization is structured as delineated in Figures (1) and (2) in Chapter II. However, the ship has taken a different approach as to the method chosen to manage the system. The Command has strong beliefs concerning the importance of SNAP-II, resulting in the assignment of an officer full-time to manage the SNAP-II system. The responsibilities of the System Coordinator and the 3-M Coordinator have been assigned to one individual, referred to as the "Maintenance Officer". As the XO's direct representative, he is responsible for the complete management of the operational and maintenance aspects of SNAP-II. The remaining Functional Area Supervisors are assigned in accordance with the Type Commanders directive [Ref. 11].

Initial training was provided to the Maintenance Officer (System Coordinator) and one Hardware Maintainer. Following the initial training, the Maintenance Officer spent many hours on the system, becoming an expert in all its functions and operations. He personally provides continuous training to all the users on a one-to-one basis. This has increased the knowledge level of the crew, but has not been a substitute for formal organized training.

SNAP-II is in the forefront of the day-to-day operations on board this ship. Since it is well organized and maintained, a high level of confidence is held in the system. The dedication, knowledge of, and support for the system provided by the Maintenance Officer is evident and is a major factor behind its success.

As much as the system is utilized, the various functions are not completely recognized or used. A perception that the system is overloaded, coupled with the lack of enough terminals and perceived slow response time are the causes for this situation. Hardware performance had been very good, as has been the support received from NAVSEACENLANT and NAVMASSO.

2. Command Perception

The Command's support (CO/XO) for the SNAP-II can be characterized as generally positive. However, there are two distinct philosophies and views presented by these individuals.

a. Commanding Officer

The Commanding Officer, having considerable experience in Washington, D.C. (assigned to OP-03), considers

the system as one that possibly should not have made it into the fleet in its present configuration. As a member of the OP-03 organization, he was very close to the initial conceptualization and program start-up. He watched the procurement process take place and remembers the stages of development as it moved through the various political and military process enroute to passing its Operational Evaluation and Certification (OPEVAL) and finally being introduced into the fleet. His views reflect this experience.

The Commanding Officer was somewhat reluctant to press his support beyond the general acknowledgement that the system exists and is present on board his ship. He concentrated on several broad topics during the interview, addressing neither specific hardware nor software oriented problems. He personally had removed himself from following the day-to-day operations of SNAP-II, and thus did not feel sufficiently knowledgeable to comment on hardware or software related problems. However, he did comment on the following subjects:

- failure of program management to recognize inputs from the fleet
- personnel dependency on the system
- training

(1) Failure of Program Management to Recognize Inputs from the Fleet. The Commanding Officer felt very strongly that the system was built without really considering what he called "real fleet users inputs." The "real fleet users" were defined as the fleet sailors, Division Officers, Department Heads, and last, but not least, the Commanding and

Executive Officers. He acknowledged that there was a study conducted in the form of questionnaires that had solicited fleet inputs, but he questioned the use of the results from these questionnaires. He felt that the majority of the issues addressed in the questionnaire were not included in the design of the system:

The system was bought by people who were not going to be the users of the system. They were management types up in Washington who lived in data processing and weren't the types who were going to sea and use it. They obviously had very little respect for fleet inputs.

(2) Personnel Dependency on the System. The next character of the system discussed was the one which the CO referred to as dependency. He felt that everyone was becoming too dependent on the system, remarking that dependency had turned the SNAP-II system into a huge crutch:

The biggest problem I see out here is that it has become a crutch. If I want an answer from one of my Department Heads or my Division Officers, I get the answer, 'well, SNAP's down, can't get that to you right now'. They rely on that machine and when the machine's down, you can't do it. What a crutch.

(3) Training. The CO voiced his opinion that plans for formal training did not receive appropriate consideration and attention during the procurement phase. The reason for this, he felt, could be tied directly to the method by which the Navy had obtained the system. He believed the decision to purchase the hardware from one vendor and then securing a second source to develop software broke the continuity required to formulate a good training plan, one that would accompany the initial implementation of the system. Under these

circumstances, the responsibility for development of a training plan is not assumed by either the hardware or software developer. Consequently, a third party normally has to be retained to develop the training plan. This tends to become a drawn out evolution, as witnessed with SNAP-II.

We should have gone out to a firm like IBM and said, look, we want a data processing system to meet the following requirements. Let them produce the system and software. When we got those, we would have had an in-depth training program accompanying the system. Why would someone put a system into the fleet without providing the proper training necessary to support it? We have to get formal training to all the potential users before reporting on board. Not like we have today.

However negative the comments by the CO appeared toward the system, support was present. Frustration was the dominant underlying factor that influenced his support for the system. Asked, ". . . as far as a management tool for you, at the Command level, is it providing you any assistance?"

No, I'm not using it. I don't even want to use it. I don't call it up. I have Admin records kept on SNAP, which I ask to have delivered to me, but I don't touch the system.

However, he continued:

I don't discourage anyone from using it. In fact, all the 8 O'clock reports and all this stuff comes off of it. I don't hold it against them if they don't use it. I don't push it. I don't say "why don't you do that on SNAP." I hold them accountable for what they're held accountable for as a Department Head.

b. Executive Officer

On the other hand, the Executive Officer expressed his ideas and concerns from a different perspective. His comments reflect the many hours he had spent in direct contact with individuals connected with the management of SNAP-II.

Unlike the CO, the XO was more open and voiced his opinions in numerous areas and his perception of the system as a useful shipboard tool.

(1) Program Support. Although not a heavy user of the system per se, he considered SNAP-II to be "a way of life" on board ships. He felt that the support, guidance and considerations afforded the system from external support sources had to drastically change. The Executive Officer was concerned that the system is not understood at various external commands, those which are responsible for supporting the system. He felt they did not have sufficient insight into the functions provided by the system and how they should be incorporated into the shipboard environment. He was apprehensive that these same individuals did not fully understand the impact the system had on the way ships are run today:

You know, everybody thinks it's business as usual. You just have a little computer that helps you with your job. The Admin of a ship is so different now. I don't think the Navy has realized it, but the way you administer a ship today with SNAP on it is completely different.

The bottom line as I see it, the Navy just has to accept the fact that this is what's going to happen in the future and everybody has got to get on board. This is how we're going to run ships, and all the outside activities will just have to accept that fact. There are some dinosaurs out there that don't want to do that.

Control, as defined by the XO, is the official establishment of a central point of contact and responsibility for the administrative matters pertaining to a program. He feels control has not been defined clearly enough to the fleet.

A defined hierarchy of responsibility could not be ascertained. He states this naturally results in poor standardization which, in turn, affects total support for the system.

Part of the problem that we see happening with SNAP is that the Type Commander doesn't realize what he has here. We have NAVMASSO, we got RSG, and we have SURFLANT. No one has taken control of SNAP, that's what we see. So consequently, every SNAP ship has gone off on its own.

Standardization is a key link towards the future success of SNAP-II. The XO expressed a desire to see some standardized guidelines as to just how a ship is supposed to use the system. He did not expect a line by line document as to the nuts and bolts of operations, but something that would define what was expected from the system. If there were defined expectations, then maybe the external support units could put together a better support package;

Now that we have a system, we have become dependent by virtue of its functions. There still is no control over its applications and really just how it is to be used in regards to how it is expected to be used. I think it resides at the Type Commander. He needs to determine how ships are going to be organized . . . organize and use this thing. I'm not saying he has to give us some black and white plan, but at least give us some guidelines that he expects us to follow. The Type Commander should come out and say, ok, this is how SNAP ships should be set up. This is what we expect the ship to be able to do.

(2) Training. In the area of training, the Executive Officer expressed concern that at the user level, there appeared to be little action planned to establish some type of formal training. He does not see any one taking control and becoming responsible for organizing such training.

In fact, one afternoon I called down to NAVSURFLANT, RSG, and NAVMASSO to have a meeting down here. They really got excited because I looked at them and said, "Ok, who is responsible for training?" SURFLANT would look at RSG, and RSG would look at NAVMASSO, and NAVMASSO would say, "Wait a minute. I'm just an implementer. I don't do anything like that." SURFLANT would say, "RSG is our agent for training." RSG kind of looked at them and said, "When did that happen?" It's simply a forest out there.

The Executive Officer commented that every supply petty officer has to know certain things about SNAP-II and that had to be taught to him somewhere, definitely prior to arriving on board a ship. The idea of all training on the system taking place prior to an individual checking on board was also applicable to officers. Once an officer arrives on board, there simply isn't enough time or terminals available for him to sit down and take a manual, in its present form, and learn SNAP-II:

Training simply has to be implemented prior to arrival to make it work.

(3) Other Issues. The Executive Officer suggested numerous other improvements as well as venting his frustrations in a constructive manner. The following are some of his comments that certainly warrant repeating:

- SNAP needs improvement in the interface with the shore maintenance activities. Still passing paper. We are still required to use work packages, run AWR's and carry them over.
- We called up and said, "what are the guidelines for how you use SNAP within the supply world?" They replied, "Well its in Annex W of our SURFSUP!" We asked, "Where is Annex W?" They said, "Well, the draft is on the N7's desk." We have had SNAP-II for two years. Doesn't that sound sad to you.

- One of this ship's major problems now with the system is the lack of terminals. Requirements on the use of the system have overgrown the amount of terminals that it would take to support.
- What's going to happen to SNAP when a ship goes into the yard? I hope someone has a handle on this one. This ship is going to a private yard. The contractor is only required to provide an ADP system. The ship would like to see another SNAP system at the site or take their system off to shore. Maybe install it in a van!

This XO continues to work with the system and supports the integration of SNAP-II throughout the ship. He states that he feels the burden, the victories, and the consequences of failure of SNAP-II more than anyone else on board. He summarized his feelings about the system as follows:

We are totally dependent on the damn thing. A lot of people don't realize . . . they think that it's just a computer that helps us write messages. They don't realize that our whole darn supply system is tied up in it! What else can I say?

3. Middle Level Management and SNAP-II

Middle level management, as defined earlier, are those officers in the chain of command reporting to the Commanding and Executive Officers. In the case of this ship, the following officers were interviewed: the Combat Systems Officer, the Electronic Material Officer (representing the Operations Officer), and the Supply Officer. The Engineering Officer was not available.

As a group, these individuals had little experience working with computers. The Electronic Material Officer (EMO) had experience, owning a home computer which he used extensively. He had written numerous programs and was active

in a local computer club. On the other hand, the Combat Systems Officer and the Supply Officer had virtually no prior experience with computers. They acknowledged that computers had only existed in their life as a "work" and nothing else.

No one within this group had received any form of training on the system before reporting on board. They had only been introduced to the system through the implementation briefing given by NAVMASSO. Their follow-on training had been through the efforts of the Maintenance Officer. At Surface Warfare Officer School (SWOS), SNAP-II had only been mentioned as a potential system that they might encounter in the fleet. No other explanation or in depth briefs had been given.

a. Supply Officer

The Supply Officer had only positive remarks about SNAP-II. There were numerous problems associated with the conversion of stock records, outstanding requisitions, and CSMP to the SNAP-II system, but he remained confident in the system. This officer felt that the system was his lifeline and if it should go down for any length of time, he would "die a quick death".

In the area of training, he felt that his personnel were not adequately trained prior to their arriving on board. Interesting to note, he endorsed a higher GCT/ARI requirement for SK's enroute to a SNAP-II equipped ship, feeling that the SNAP-II system required a higher degree of conceptualization versus the former "hands on" manual method of supply procedures.

b. Combat Systems Officer

The CSO's comments and views generally were addressed to SNAP's use as a word processor and as a system to handle his CSMP and supply approval process. He did not see it as a management tool. His training so far had only been on operating the system to review documents through the menu driven mode. He has not found the time nor did he have the desire to work through available documentation to increase his knowledge of the system. Having to continually go step-by-step through the menu-driven programs without an option to access directly the function he wanted seemed to him to be unnecessary. Although not a heavy user of the system personally, the CSO still believed that if the system were to go down for any prolonged period of time, his department could not function.

c. Electronic Material Officer

The EMO expressed both positive support for the system and frustration as to its limited capabilities. As an experienced owner and user of a home computer, his use of the system was more extensive than the others. He personally used the system to administer his CSMP, produce all of his 8 O'clock reports, maintain all his supply/maintenance transactions, and made extensive use of the MUSE word processing application. By EMO's standards, this system is not very user friendly. He made an interesting comment with regard to the system effecting his daily routine as a manager:

SNAP-II is controlling my work instead of me controlling it.

He considers the system too slow and cumbersome for someone with a computer background.

4. System Operation and Maintenance

a. System Coordinator

The Maintenance Officer (a Lieutenant) performs the functions of the System Coordinator, 3-M Coordinator, and is the MDS Functional Area Supervisor. He is assisted by a Senior Chief Petty Officer (EMCS). Their role functions are the control of maintenance paperwork and the operation and maintenance of the SNAP-II system. The Maintenance Officer brought out the following key issues:

(1) Training. He considered his initial training by NAVMASSO as oriented toward preparing him to only help someone procedurally through their particular program. Instead, he felt it should be reoriented to provide the System Coordinator with an understanding of the entire system. He remarked that it was essential that the System Coordinator have a good knowledge of all the functions and applications and how they fit together to work as a system.

Training provided for the Department Heads and Division Officers was inadequate. The Department Heads and Division Officers do not use the system as a management tool due to the simple reason that they have not been trained to use it as such. They need management level orientation.

(2) Documentation. Documentation has been compiled and written somewhat in the same format as our training plans.

It is partitioned into different components and functions. It does not bring it together to form a working system. This is felt to be adequate for someone who could be classified as a simple button pusher but not for someone trying to understand the system.

(3) Excessive Duplication. Excessive duplication of efforts are continuing to take place. The requirements for hard copies of items which are all available on the system have not decreased. Shore establishments have not taken the effort to get on board with the fleet.

In closing, the Maintenance Officer offered the following comment:

The system is great if one had the time to learn it all. I'm trying to teach everyone as much as possible as soon as possible. Time may solve this problem, but will the system survive this (training) crisis? It's a waste not to be able to use it to its fullest simply because someone has dropped the ball on just what level are we going to train. Someone has to get on top of that one soon. Ignorance will kill the concept.

b. Functional Area Supervisors (FAS)

The Functional Area Supervisor for MDS was the Maintenance Officer. His comments can be found in the System Coordinator section and will not be repeated here. The Supply Officer and a PN1 were assigned as the Functional Area Supervisors for SFM and ADM subsystems, respectively.

As a group, the FAS's all expressed total support for the system. They each felt that training was inadequate and that they only used the system within their area of responsibility. They all agreed that the job could be handled

in a satisfactory manner on a collateral duty basis. Extensive comments or ideas were not voiced by these individuals. "Yes" or "very much so" were the general comments when questions were asked.

c. Hardware Maintainers

The hardware is presently being maintained by two Third Class DS's assigned from the Combat Systems department. The training provided was characterized as excellent. Both individuals felt quite confident in their ability to maintain the system. As a collateral duty assignment, they felt that they did have sufficient time to handle the additional requirements for scheduled PMS and repairs. Each expressed excitement about their association with the equipment.

The only negative aspect detected came in the form of frustration for not being allowed to perform maintenance in a more detailed fashion. They expressed concern that there were numerous conditions that arose and failures that occurred that they were capable of fixing if the maintenance concept of SNAP-II allowed it.

F. CASE 6

1. Introduction

The completion of hardware installation in this East Coast Spruance-class destroyer took place in December, 1983. The SNAP-II System was fully implemented by the end of January, 1984. This ship has the standard SNAP-II hardware equipment configuration for a ship of her class and size.

Version 4.00.07 of the SNAP-II software is presently installed and operating satisfactorily.

The installation and implementation of the system was successfully completed during an extended in-port period. The success of this was attributed to the excellent implementation briefing and initial training provided by NAVMASSO. A contributing factor to the success was the number of key individuals on board that had exceptional backgrounds in information systems. All difficulties encountered during this period were promptly resolved by NAVMASSO.

The system has functioned satisfactorily and the support received from NAVMASSO and NAVSEACEN has been excellent. While on an extended deployment out of CONUS, the system experienced a power supply failure and through extraordinary support received from SMA and the supply system, a new power supply was received and installed in less than 82 hours.

Support for the system throughout the entire ship is very positive. This ship had been a prototype installation for the SNAP-II program, designed to identify what requirements, benefits and problems would be associated with an afloat automated information system. As a result, some of the personnel on board have retained a personal interest in assuring that things were done right the first time.

A chief petty officer (DSC), very experienced in the computer field and have a B.S. in Computer Science, has been assigned as the System Coordinator. An enthusiastic First

Class Petty Officer (EM1) is assigned as his assistant as well as the Functional Area Supervisor for the MDS subsystem. A Chief Petty Officer (SKC) from the Supply Department and a Chief Petty Officer (PNC) from the Personnel Office are assigned as the Functional Area Supervisors for the SFM and ADM subsystems, respectively. The hardware is maintained by a Second Class Petty Officer (EW2) and a Third Class Petty Officer (DS3). Both of these petty officers are from the Operations Department.

Tremendous attention has been given to this system in order to assure its continuous operation and support. It is used virtually by all levels of the command. Realizing that the system is supporting the entire ship's organization, there was a display of enthusiasm that permeated the entire ship.

2. Command Perception

The command support given to SNAP-II on board this ship was extremely high. Both the Commanding Officer and his Executive Officer expressed full support and dedication to the system. Although the Commanding Officer had been in Command for less than four months at the time of this interview, he was quick to point out the significance and the benefits of SNAP-II. He was pleasantly surprised to observe the intensity with which each manager used the system.

The Commanding Officer attributed the success of the system to the intense efforts expended by the System Coordinator. He felt that this individual's experience and talent had paved the way for others to expand their knowledge

and use of the system. Having an experienced System Coordinator in charge of the system gave the CO a feeling of enormous confidence in the system.

Generally, the Commanding Officer expressed a great degree of satisfaction with the system. Though enthusiastic, he was not sure as to how he would personally use SNAP-II, if at all. He had a terminal in his cabin but had not used it, nor did he anticipate using it. However, there were a few areas in which he did voice concern.

a. Training

In the area of training, he was disappointed in what he believed to be the failure of the shore establishment to support SNAP-II. He cited a case of sending his 3-M Coordinator to school and finding that SNAP-II was not even mentioned. He was frustrated that time and effort had been spent to send this individual to school and SNAP-II was not taught.

b. Standardization

After becoming aware that there were some minor problems associated with the system, the CO attempted to organize a cross talk program with other ships within his squadron. He quickly discovered that this was not productive because each ship had implemented SNAP-II in a different manner. There was no standardization, no uniformity in depth and breadth of system use and application.

The Executive Officer reflected the majority of the comments made by the Commanding Officer. He did note that SNAP-II had become the routine way of doing business and all activity would come to a stop if the ship experienced a casualty to the system. On the negative side, he felt that overall support from the shore establishment was at least two to four years behind the activities of the fleet.

3. Middle Level Management and SNAP-II

The middle level managers interviewed were the Operations Officer, Supply Officer, and the Engineering Officer. The Combat Systems Officer was not available for comment at the time of the interview. Within this group, only the Supply Officer had any previous experience working with any form of ADP. He had been in numerous billets associated with various ADP systems and had been assigned as the SNAP-II Program Officer on a Type Commander staff. The remaining officers had been exposed to the SNAP-II system only since reporting on board this ship.

As a group, these officers voiced practically the same views concerning their likes and dislikes with the system. They all expressed the feeling that the system was designed to be utilized more by Division Officers and assistants than by the department heads. They felt the system did not provide the information they needed to perform their jobs. They were not heavy users of the system, using only the word processing capabilities and the functions which required them to review

the various maintenance and supply actions. These officers commented that their enthusiasm to expand their use of the system was hampered by the fact that they had not received any formal training on the system. Each one commented that they did not have the time to devote to learning the system once they had reported on board, relying instead on their division officers and assistants to perform subsystem functions. Each stated that they were comfortable only with using the system as a word processor and to review maintenance and supply actions. Since the Department Heads had not developed confidence in the system, they continued to maintain duplicate hard copies on data held in the system.

As a result of having the system on board, each middle manager expressed the belief that he certainly expected a more complete and better quality product from his subordinates. Since it was relatively easy to edit their input and correct mistakes, error free documents were expected.

4. System Operation and Maintenance

The System Coordinator had reported on board without having any prior experience with or knowledge of SNAP-II. He did, however, bring with him 12 years of experience from working closely with computers in the Naval Tactical Data System (NTDS), as well as a B.S. in Computer Science. He has attended the System Coordinator course conducted by NAVMASSO prior to implementation of the system.

The System Coordinator voiced his assessment of the system in broad terms, commenting on the following topics: installation/implementation, support evaluation, training, and general overall software evaluation.

a. Installation/implementation

During the installation and implementation phase, the ship received excellent briefings on what was going to be installed and how it was going to take place. At no time was the ship asked to comment on what was going to happen to their ship. "Here is what you are going to get, this is how we are going to install it, and this is where the components are going to be placed" was the order of the day. The System Coordinator felt very strongly that the ships should have the flexibility in determining where the terminals should be installed.

b. Support Evaluation

The support and attention provided to the system by NAVMASSO and the Type Commander was considered to be outstanding. When there were problems with the software, NAVMASSO responded almost immediately. The response to CASREPS was excellent, and software problems were resolved through message traffic in an expeditious manner while the ship was deployed.

c. Training

Training was considered to be inadequate at all levels. However, he did think that a considerable amount of

training could be accomplished on board our ships if there was a Navy-wide plan that would standardize the overall training. The System Coordinator felt that instituting a PQS program would go a long way in achieving that goal. Although the System Coordinator was orienting his comments concerning training toward the enlisted personnel, he felt strongly that there should also be a formal training plan established to provide the Department Heads and Division Officers a management oriented approach to the system.

d. Software Evaluation

The software as presently designed was considered adequate for a user that has to take a step by step approach to any application. As the experience level of individual using the system increases, this approach will become time consuming and will be considered elementary, creating a feeling among users that the system is becoming obsolete and decreasing in its value as a useful information system. It will then become annoying to work with the system as it is presently designed, thus relegating it to transaction processing only.

In summary, the System Coordinator is a very enthusiastic individual who feels that the system is the way of life today on board his ship. His final comment was:

The system is an excellent one, but first we all have to learn how to use it before it will become acceptable.

The Functional Area Supervisors had very little to say about the system. They all supported the system and

expressed that it had received positive support throughout the entire command. Since the System Coordinator took it upon himself to perform essentially all the duties that were normally assigned to the Functional Area Supervisors, they remained somewhat aloof and accepted this status quo.

V. SUMMARY OF CASE STUDIES

The previous chapter presented the views of shipboard personnel who have been operating with the SNAP-II system for at least one year. Their perspectives and opinions have been developed through constant association and experience with the system.

The following summaries present a synopsis of the main issues identified by the individual ships as having had an impact on the integration and use of the SNAP-II system within their organizations. Also included are summary evaluations by the authors as to the general extent to which the SNAP-II system have been assimilated by the ships, based on the interviews and through observation.

A. CASE 1

1. Evaluation of Ship

Stated briefly, this ship has transitioned successfully to the SNAP-II system and personnel are finding new and innovative ways of adapting it to their organization. Users at all levels of the ship are very pleased with the system and are using it extensively.

Management is using the system as a tool rather than relegating it to use at the lower echelons as a data entry and transaction processing system.

The ship is pleased with the performance of the hardware, and had not encountered major problems in the concept of using collateral duty personnel to manage and maintain the system. Support provided by NAVSEA and NAVMASSO was regarded as very good.

Evident through observation and as a result of the various interviews, the ship had several strong qualities that positively influenced the implementation of the SNAP-II system:

- a strong commitment to excellence in the first place
- personnel with backgrounds in computer systems available to help guide the transition
- strong involvement of the middle level managers in the transition

2. Significant Issues

The specific items of concern raised by the ship's personnel and regarded as significant were as follows:

- Inadequate documentation for the various levels of system users. This was raised from several perspectives, including lack of readability and the absence of different perspectives and levels of documentation (i.e. not everyone can effectively use a data-entry user's "view" of the system to understand and use the system).
- Training was brought up as a problem, not in the area of initial training, but in the context of "continuing education" for on board users in the future, and from the viewpoint that formal schooling should be made available to the Functional Area Supervisors (and possibly lower level users) in addition to training presently available for the System Coordinator.

Although not specifically alluded to during the interviews, there were two further areas of interest evident:

- After implementation of the SNAP-II system, the ship was not reviewed or audited by program management to find out

how the system was working. There was no positive action to find out if there were problems integrating the system, only reaction to specific problems reported by the ship.

- There is a lack of understanding of how the program is set up and managed ashore. Because of NAVMASSO's close involvement in the conversion and implementation of the system, the ship regards them as the focal point for dealing with SNAP-II problems and suggestions. In some cases this is true. Otherwise, there is little official communication on project status, improvements, or how the project is being handled on a Navy-wide basis.

B. CASE 2

1. Evaluation of Ship

Implementation of the SNAP-II system in this ship has been successful at the lower levels (data entry personnel), but has not been put to great use by the middle level managers. At this level, it appears that the system is regarded as something to be contended with, and as such is not used as a management tool.

While the system is appreciated and fully backed by the command, and the data entry personnel are having no problem using the system, there is a "gulf", or void in the middle where the system is accepted at face value only. There is apparently a lack of understanding as to how to incorporate the system so as to derive its benefits.

The reason for the above is not a lack of positive atmosphere in the command. The benefits derived from the system are fully appreciated throughout the ship, but there has been no movement to expand the use of the system or develop new methods to incorporate it as a management tool.

The reasons for the above appear to be:

- lack of adequate training or "selling of the product" to the middle level managers
- the documentation is regarded as difficult to assimilate
- system capabilities are not fully understood by system management personnel--the system coordinator and the functional area supervisors

The ship has had few problems with the hardware, and support of the system by NAVSEA and NAVMASSO has been good.

2. Significant Issues

Specific items of concern raised by shipboard personnel include the following:

- documentation not aimed at management and difficult to understand
- inability to derive useful information that can be utilized by management
- the effect on management style by the introduction of an automated information system
- the adequacy of the number of terminals on board

An additional point made by the Commanding Officer was that until this survey had been conducted, no one external to the ship had come aboard to inquire about the status of the system and how the ship was using it.

C. CASE 3

1. Evaluation of Ship

The hurried manner in which SNAP-II was installed and implemented had a lasting effect on the performance of this ship. Compounded by significant downtime shortly after implementation, the personnel lost confidence in the system resulting in a slower rate of progress in bringing the system on line. The neutral command support adversely affected the

drive of the personnel to utilize the system and has resulted in the ship still not performing all subsystem functions.

The ship's personnel are gaining confidence in the system and have started to effectively use the system for management of daily operations. The middle level managers still do not have a management perspective on how to utilize SNAP-II. They perform those functions that are mandatory but do not seek to understand the potential of the system in assisting them in managing their functions.

Ship's personnel are impressed by the system's capability to perform routine work and think that despite its shortcomings, it has reduced the administrative burden. As the Combat Systems Officer stated, it's "better than not having it on board."

2. Significant Issues

The interviews with ship's personnel uncovered a myriad of problems, suggestions and complaints. The following issues surfaced as being the most significant:

a. SNAP-II needs to be more fully developed as a management information system and the ship's command and middle level managers need to be trained in the effective use of the system as a management tool.

b. The shipboard and shore establishment personnel need to broaden their perspectives on the effect SNAP-II has on shipboard routines. It is currently being thought of as an aid to management. It will become the "management system."

Administratively speaking, the ship will succeed or fail by how they utilize SNAP-II.

c. The lack of access to terminals hinders effective use of the SNAP-II system and wastes precious manhours.

d. Documentation and guidance manuals need to be improved or reflect guidance for managing with the SNAP-II system. Documentation is inadequate for training new users and of limited value in solving problems. Guidance in using SNAP-II from the Functional Managers (e.g., NAVSUP Manual P-485, OPNAV 3-M Manuals) is nonexistent.

D. CASE 4

1. Evaluation of Ship

This ship's approach to management is to manage by exception and do only what has to be done. In one word, "survive". The command does not foster the use of SNAP-II. The lackadaisical approach to the effective utilization of the capabilities of the system leaves subordinates with little enthusiasm to make the system perform effectively. Currently, the system is not fully implemented and various functions are not utilized.

The ship views SNAP-II as merely a transaction processing system and SNAP-II is not utilized to better manage their functions. The ship has just replaced a manual system with a mechanized system without reaping the benefits of automation. They do feel it has greatly improved the accuracy and timeliness of data and has proved its value to the ship.

2. Significant Issues

The following issues came to the forefront:

a. SNAP-II system's management capabilities need to be expanded and the ship's managers need training in how to effectively utilize these management capabilities.

b. Training needs to be improved in the following areas:

- depth of implementation training
- packaged training for Functional Area Supervisors (FAS)
- Off-ship training needed for CO/XO down to the FAS level
- functional area (rate) training needs to be strengthened

c. The number of terminals need to be increased to reduce man-hours expended waiting for terminals and to expand access for management uses.

E. CASE 5

1. Evaluation of Ship

The installation and implementation of SNAP-II was conducted in an orderly and expeditious manner, however, the conversion of stock records, outstanding requisition file, CSMP, and COSAL experienced considerable difficulties. It could not be determined if the discrepancies resulted from the conversion process or were present in the original records prior to conversion.

The Command demonstrated a positive attitude toward the system. There were some perception differences between the Commanding Officer and the Executive Officer; the CO was frustrated due to the way he perceived the procurement process

to have taken place, feeling that it had resulted in a system designed without including input from fleet users. This had resulted in a system that was introduced without providing an accompanying Navy Training Plan. The Commanding Officer does support the system and desires to see it improved to a point that it can become what he considers a management tool. On the other hand, the Executive Officer sees it as the way the Navy has chosen to institute on board automated information systems. Therefore he continually strives to make it work.

Unlike other ships interviewed, the Command chose to take a different approach as to the management of the system. It was felt that the importance of the system justified the assignment of an officer full time to manage the operations, maintenance and training for the SNAP-II.

The middle managers were all supportive of the system and welcomed its contribution in relieving their administrative burdens. They all voiced their opinions that if they had received formal training, they would be making better use of the system.

2. Significant Issues

The following issues surfaced as being the most significant:

- training is not available for personnel prior to reporting on board, lacks a management perspective, and there is no action on implementing the Navy Training Plan
- inadequate number of terminals
- lack of program support in the form of program guidance, standardization on board ships, interface with external commands, and knowledge of impact of SNAP-II on ship

- developing the system as a Management Information System
- documentation lacks a management perspective

F. CASE 6

1. Evaluation of Ship

This ship enjoyed a successful installation and implementation of the SNAP-II system. The hardware and peripherals have performed satisfactorily, creating respect and confidence in the ability of the system to perform required functions. The only comments concerning hardware were in the form of requesting more terminals.

The system is operating as a very successful transaction processing system. There is a considerable amount of computer knowledge available among several key individuals. This no doubt has contributed favorably to the success of the initial transition as well as the continuous operations of the system. At the Command level, there was a very positive attitude toward the overall system and one sensed a feeling of dedication toward the future success of SNAP-II. They see a great amount of effort going into the system and in turn see the benefits it returns. Overall, management has commented that the SNAP-II system had been accepted as the way of the future for the Navy in regards to ADP on board ships. It is performing adequately, but no one really knows where they are going with it.

The use of the system has not reached its full potential. The middle level managers commented that they were not expanding their use of the system to the point whereby it would become useful as a management tool because they:

- had not been afforded the necessary training prior to arriving on board to effectively use the system as a management tool
- did not have the time once arriving on board to devote sufficient time to learning the system well enough to be able to use it as a management tool
- Division Officers and their subordinates were the real users of the system, not Department Heads

At the levels below the Department Heads, the system is being used extensively. The Division Officers maintain the majority of their required administrative records and files on the system. It was stated that this has provided them a more effective and efficient way to manage their division.

2. Significant Issues

There were several areas of concern which were identified:

- Support was not being provided to the fleet in the form of recognizing the present need to include SNAP-II training in various schools.
- Training should be provided to all levels of users prior to reporting on board.
- Standardization is lacking in the depth and the breath of the use of SNAP-II.
- The system has become the routine way of business and that the overall support for the system from shore establishments is two to four years behind the fleet.
- A PQS program needs to be developed for the various levels of users.
- There is an inadequate number of terminals.

VI. ANALYSIS AND DISCUSSION OF CASE STUDIES

The issues that emerged from the ship reviews will be presented in two different sections: an overview analysis of the case studies will be done, and from these, a discussion of specific items that transcended the various issues in the case studies.

A. PROGRAM PERSPECTIVE AND GENERAL ISSUES

Program management is defined, for the purposes of this thesis, as all commands external to the users command that are involved in the procurement, outfitting, installation, implementation and operation of the SNAP-II system (Chapter II presented an overview of the program management organization). In addition, those external commands that directly support the ship's supply, maintenance and administrative functions (e.g., Naval Supply Centers, Fleet Accounting and Disbursing Centers, Ship's Intermediate Maintenance Activities, Destroyer Tenders, Navy Finance Center) are included when discussing the interface between SNAP-II and the shore establishment.

The value of any system ultimately rests in its acceptance by the user. User satisfaction is the key determinant when discussing any system's benefits. Across the board, the SNAP-II system is viewed as a tremendous benefit to the ships in the performance of those functions that have been mechanized. Although user satisfaction appeared to be high, there was a

considerable amount of frustration in regard to various aspects of the system. From the afloat vantage point, SNAP-II could be significantly better than it is today. There were numerous problems cited and issues raised, that, when viewed in totality, had a common root insofar as the ships were concerned: program management. This may be a misconception on their part, but there is a certain level of disenchantment with the way the program is being managed. In and of itself, this is indicative of a need for increased and effective communication with the fleet user.

On closer observation, the satisfaction and enthusiasm for the system was mainly at the functional area supervisor level. Their enthusiasm appears to be due to the newness of system and the advantages of a mechanized approach over a manual approach. The impression is that as these users become more sophisticated, they will be less willing to accept the problems they have encountered, and if the problems persist or recur, their enthusiasm will wane.

The ship's managers, on the other hand, are less satisfied with the system. They feel for the most part that SNAP-II does not address their needs as managers. Although it does provide them the ability to manage specific operations, it does not lend itself well to overall management of their department or area of responsibility.

At the command level, the system is of little use as a decision making tool, and as such is ignored. The system was

not regarded as being able to provide answers to ad hoc questions. Although some of the Commanding Officers and Executive Officers give the system high marks in the area of performance of specific tasks and management review of them, none felt that it was of use to them in guiding the ship toward mission accomplishment. As one CO pointed out, SNAP-II was just another way of doing the same job.

The various ranges and depths indicated in the summary Chapter V gives an indication of the problem associated with assessing the status of SNAP-II on board a particular ship. Due to a lack of standardization, each ship has employed SNAP-II in a different manner, depending on the importance the command (CO/XO) attached to SNAP-II, the command involvement in the management of the system, quality of "available" personnel, location of the hardware on board, and many other factors peculiar to a specific ship. Ships are at different levels of utilizing the system as a whole. Kroenke has categorized computer systems according to how they are employed in the management of an organization [Ref. 14:pp. 91-94]:

- Decision Support Systems - provides for ad hoc manipulation and handling of data; irregular or one time queries for information can be handled
- Management Information Systems - provides past, present and future information; generates preformatted reports to facilitate management decision making
- Transaction Processing System - receives and records changes to a data base, and produces appropriate documents

Some ships are basically capable of effectively utilizing the system to process transactions, while others are using the

system to manage the transaction processing, and there are those that are pushing their use of the system towards the MIS arena. This situation is exacerbated by having each subsystem employed at different levels within any ship.

Though the comments received were for the most part localized to a specific problem area, there were a number of significant issues raised that apply to overall management of the program. The ship's have serious questions in each of several management support areas that drive home the user's impression that SNAP-II planning was not well thought out and management has not been coordinated.

In this context, management support has been divided into the following six broad areas:

- direction of program
- guidance provided
- hardware/software support
- training
- communication
- interface with shore establishment

Though these areas are arbitrary and do not relate to any charter or list of responsibilities, they serve to focus in on the major concerns the ships have with the SNAP-II system. Each area will be discussed and the significant issues (from the ship's viewpoint) will be brought out. [Authors note: System management terms have been utilized to concisely convey the intent or meaning of what various personnel felt and said-- obviously, they did not use them themselves.].

1. Direction of Program

The overall direction of the SNAP-II program, from the ship's perspective, is to mechanize manual functions in the supply, maintenance and administrative areas. They do not necessarily view it as an effort to reduce the administrative burden on ships, and few of the middle level managers interviewed saw it as an attempt to provide management capabilities in performing their functions. The system is viewed mainly as a Transaction Processing System with minimal management capabilities, providing only those management capabilities necessary to manage specific operations. It is not perceived as a Management Information System (MIS) or Decision Support System (DSS), but the Command level and middle level managers feel that it should perform at least at the MIS level.

The two issues that weighed most heavily on the minds of the interviewed personnel were: the lack of project review by program management at the ship level as a tool to guide the direction of the program, and whether SNAP-II was intended to be a Transaction Processing System, Management Information System, or a Decision Support System. The issue of lack of project review of ships with SNAP-II installed will be discussed in the following section on specific emergent issues.

The issue of SNAP-II's purpose as a system originates from the discontinuity between the phrases used to describe the goals and attributes of the SNAP-II system (e.g., real-time MIS [Ref. 1:p. 1]. Automated Information System [Ref.

3:p. 1] and the reality of what the system can do, or more importantly, what it cannot do. The managers feel that program management does not understand the needs of the fleet with regard to the output the system should provide.

If it is assumed that SNAP-II is a management system, then there appears to be a dichotomy between its purpose and the amount of hardware provided to accomplish this. Namely, with the word processing capability and the management function superimposed on the transaction processing system, the number of terminals appear to be inadequate to handle the management function. As the case summaries showed, every ship felt that they did not have an adequate number of terminals to perform the functions within SNAP-II. The transaction processing and related day-to-day actions by managers took priority and subsystem management uses and word processing were relegated to a "catch as catch can" status. As a group, the middle level managers felt word processing was an important management tool, yet they could not use it to its fullest extent due to the effects it had on system performance (response time) and transaction processing.

2. Program Guidance

For the purposes of this review, program guidance covers the implementation and operational guidance received from external commands. This does not include the training of personnel, as that will be covered in a separate section. Although each ship felt program guidance was inadequate, this

area was not considered a key issue in and of itself, but was in the background of most emergent issues. It is discussed because it serves to provide a background that is relevant in other areas that were identified by the individual ships.

As stated in various cases, the implementation process that NAVMASSO oversees is considered to be good by the ships reviewed, and was not a major issue except as it related to documentation and training. These two issues will be discussed in the next section on specific emergent issues.

The operational guidance which is within the purview of the ship's chain of command and the supporting shore establishment (refer to Figures (3) and (4) in Chapter II) was considered as inadequate or non-existent. The Type Commanders were the only bright spot in the process. They have provided guidance, but, as with any new program, it was not timely or in sufficient depth. The Executive Officer of a destroyer noted that the ship had been waiting "two years" for the guidance that the "Annex W of SURFSUP" was going to provide.

Unlike the Type Commanders, the shore establishment has not provided guidance on how to effectively integrate SNAP-II into the shipboard routine. The functional managers have not updated basic publications (e.g. NAVSUP Manuals, 3-M Manuals) to include policy or procedural guidelines. Some of the ships have had SNAP-II on board for two years and are still waiting for this basic guidance.

3. Hardware and Software Support

The ships did not report many problems with the hardware and it was considered very reliable (Chapter III provides background information on hardware and software). Another bright spot in the whole program is the support the ship receives in the maintenance of hardware and software. As noted in each of the cases, the performance of both NAVSEACENS, NAVMASSO, and NAVMASSO DETPAC has been outstanding in the area of response to problems and questions. As documented in Case Five, ships had stories of superlative effort put forth to support them when they needed it. The software, although there were numerous problems, was not a major issue to most ships. The users had a tremendous number of suggestions to improve the subsystems and identified numerous problems with programs (all at the procedural level). No major problems were cited that had not previously been identified by NAVMASSO. As stated previously, the users at the lower levels are impressed with the functions performed by the software.

The issue that dominated any discussion of software was that of documentation. Documentation was considered inadequate for training and of little value for problem solving and as a general reference. Documentation will be discussed in greater detail in Section B of this chapter.

4. Personnel and Training

The subject of personnel was not a major issue, other than as it related to training (Chapter III provides

background information on personnel and training). The concept of using collateral duty personnel to run and maintain the SNAP-II system, with exception of relatively few comments, was felt to be sound. Although a number of system coordinators and maintainers felt that it could affect their primary functions, no data or documentation was provided to support their feelings. It is felt that there will be incidences where it will affect the support of SNAP-II, but they do not warrant a change in policy at this time. The most frequently discussed issue and the one with the most immediate concern was training. Their criticism of program management crystallized with the topic of training. Training will be discussed in Section B of this chapter.

5. Communication

The area of communication was not the subject of much discussion by itself, but was linked to almost every other issue that surfaced. To that extent, it is an underlying cause of, or a result of each issue that the ships surfaced. From the afloat viewpoint, there is a lack of communication at all levels and in all management areas of the SNAP-II program. The issues raised were: lack of fleet input, lack of dialog with the fleet on matters concerning operations, and the lack of understanding of the program's decision making process in the fleet.

Most of the managerial personnel feel that the program got off to a bad start as a result of a lack of good fleet

input or input that appeared to be ignored by the program management (Case Six presents a good example of this view). Instead, program development was controlled by personnel who were too far removed from the realities of shipboard life and who relied on manuals to provide the necessary guidance. To managerial personnel, the system was not developed to meet shipboard needs as they view it.

Until recently, there was little effort to have a dialog with the fleet concerning the problems and issues they have, or to provide them information on the status of problems or expected changes to the system. There is little in the way of public relations concerning SNAP-II aimed either at the ships or at the shore establishment.

The cases disclosed that the fleet has very scant knowledge of the infrastructure of the SNAP-II program and little information on the decision making process. To the ships, the SNAP-II program is embodied by NAVSEACEN and NAVMASSO, with the TYCOM playing its traditional role of monitoring the problems associated with SNAP-II. From the end user viewpoint the power to make decisions rests with NAVSEA for hardware and NAVMASSO for software and all other concerns.

6. Interface with Supporting Shore Establishment

The interface consists of the way in which the ship and the supporting shore establishment pass requirements and information. The issue here lies with the way the external

activities provide services or assistance. This interface is in the manual mode and not prepared to handle the mechanized output from SNAP-II. This problem has been noted by several of the ships visited. Specifically, the maintenance activities (e.g., dealing with work packages, RAV), supply activities (e.g., dealing with requisition processing, status on procurements) and financial activities (e.g., dealing with processing of obligations, reconciliation of expenditures) cannot or do not accept the mechanized output of SNAP-II. These activities are, for the most part, in the manual mode of communicating with ships.

Another shortcoming of the system is the lack of use of telecommunications to support the ship while at sea and while in port. On board ship, various processes could communicate directly. For example, it is archaic to create an outgoing message on SNAP-II, punch a paper tape, carry the paper tape to radio central to be fed into a machine to be transmitted off the ship. Also, the ship does not have the capability to communicate directly, via telephone lines, with supporting activities when it is in port.

B. SPECIFIC EMERGENT ISSUES

The previous section gave an overview and analysis of the issues raised by the ships. This section will focus on those issues that have had the greatest impact on the integration of the SNAP-II system and transcend many of the issues raised by the end user.

1. Project Review, Management Policy, and Standards

Management policy for the use (vice management of) of SNAP-II system was an item of concern in many of the ships reviewed. The subject of project review, although brought up only as a tangential issue in several cases, in and of itself was nevertheless conspicuous by its absence. These two issues are closely related, as the review process must have some standard to be compared with, and these standards are driven by policy decisions. As one Commanding Officer noted, the interviews herein were the first time someone external to his ship had been aboard specifically and formally to inquire as to how the various aspects of SNAP-II were performing in his command.

a. Need for Project Review

Any computer project has risks. Among other definitions, risk is defined by Cash, et al [Ref. 15:p. 313] as:

- failure to obtain all, or even any of the intended benefits
- increased costs of implementation
- longer time for implementation
- technical performance of system below estimates.

To reduce the risk inherent in any project, proper management tools must be brought to bear to control the project. From a systems point of view, Senn defines a control model as [Ref. 16:pp. 12-13]:

- a standard for acceptable performance
- a method of measuring actual performance
- a means of comparing actual performance against the standard
- a method of feedback.

Senn further categorizes the formal process of determining how well the system is working, how it has been accepted and whether adjustments are needed as "post implementation review" [Ref. 16:p. 542]. In this context, "post implementation review" can be regarded as a feedback method to determine if the actual installed and working computer system is doing what it was designed to do. A case study advanced by Cash et al [Ref. 15:p. 357] places post implementation review as part of the control and monitoring process, which is analogous to the system feedback concept.

As established, the only feedback provided for in the current SNAP-II program is a reactionary one--i.e., ships generate reports describing trouble with hardware or software, or suggesting changes to some aspect of the system. While there is informal liaison maintained by NAVMASSO implementation personnel after installation, there is no formalized or "active" review process. Periodic meetings are conducted on a geographic basis to discuss system problems or new developments, with fleet attendance highly encouraged, but not mandatory. "Technical Advisories" and "Fleet Bulletins" are also published by various sources.

A post implementation review can be used as feedback to improve system effectiveness and attain the bottom line of user satisfaction. Various authors have outlined both the need for post implementation reviews and the general character they should take. Gaydasch has formulated what he terms a

"quick and easy approach" to this process [Ref. 17:pp. 54-55], maintaining that the review, or audit, should be performed after the system has had a chance to "settle down". The general outline of his recommendation are as follows:

- compare promises to deliverables
- monitor operational performance through observation
- evaluate the quality of information
- evaluate security, backup and recovery provisions
- determine adequacy of system documentation
- interview users

As a result of this, the review should reveal system problems and recommendations from the users. Both are vital for continuity of system expansion and growth. More detailed recommendations for what a post implementation review can entail can be found in works by Senn [Ref. 16:pp. 542-547] and Lucas [Ref. 18:pp. 515-521].

b. Policy and Standards

(1) Measurement. In following the system model, a post implementation review serves to measure the actual performance of a system against a standard, or what it was intended to accomplish. As a result of this comparison, positive action can be taken to correct any discrepancies discovered.

Defining exactly what the SNAP-II system was intended to do may be difficult. From one aspect, one may simply state that if it accomplishes the specific functions it was programmed to do, then it is a success. However, the programming or software function is just one part of a computer system. As defined by Kroenke [Ref. 14:p. 22], hardware,

software, data, procedures and personnel constitute a computer system. Therefore, to measure the effectiveness of the system, all must be measured against a standard.

(2) Standards. As the SNAP-II program has been implemented, it appears that only four of the five components of a computer system as defined by Kroenke have some standard established. Hardware, software, and data are sufficiently defined and standardized by project documentation. The program implementation document and Type Commanders instructions specify what personnel shall be used and what training they will receive. From a system viewpoint, procedures are partially unspecified. Certainly, there are procedures specified as to how to run and manage the system itself, but there is no guidance as to how to integrate the SNAP-II system procedurally into the overall current ships organization and operation.

There are two directions from where procedural or policy guidance and standards for SNAP-II integration into the organization can come from: the ship's administrative commander (i.e., Type Commander) and the shore establishment, which has cognizance over Navy-wide management and support systems, such as the supply and maintenance systems.

Frustration was evident in all reviews because of a lack of policy guidance as to how to integrate the SNAP-II system into the management of the ship. Kroenke has categorized computer systems according to how they are

employed in the management of an organization, as cited previously. Some ships are utilizing the system as a transaction processing system, while some are a level above and attempting to use it as a management information system. Some standard or policy must be established so that system use is uniform and fleet units can use the SNAP-II system to its full potential.

There is little or no policy guidance as to how the SNAP-II system is to be integrated with shore establishment responsible for supporting the fleet. This has been commented on in various ships in relation to the 3-M System and the supply organization, and has been evidenced through ships still being required to furnish "hard copy" documents to shore activities to accomplish maintenance actions, such as work requests (OPNAV 4790/2K) and measure calibration. Further, several ships report that the shore establishment is not prepared to deal with an automated ship, and does not fully understand what the SNAP-II system is capable of doing.

2. Documentation

The issue of documentation was raised from two viewpoints: inadequacy of documentation to assist and educate the manager, and that existing documentation suffers from a lack of readability and organization. The latter may well be the cause of the former.

The inadequacy of the existing documentation was cited as a specific area of concern throughout the reviews, being

identified as an aggravating factor in the areas of management and training in relation to the SNAP-II system.

a. Management Perception

The underlying reasons for the dissatisfaction with the current documentation are varied in nature. Generally, the data-entry personnel are not reported as having problems with documentation, only the personnel concerned with management. Specific attributes of the documentation and circumstances were not cited, just a general lack of confidence and use brought on by negative initial impressions.

In this sense, the documentation provided was viewed as adequate for guiding personnel in the entry of specific data in specific menu-driven screens, but of limited use in answering questions or as a management tool.

The managers expressed concern that the documentation was hard to use and difficult to understand. They felt it was written for "computer literate" people, finding the terminology confusing and lacking a management summary. They could not easily reference the document for questions of a broad nature and the documentation did not illustrate the inter-relationships between subsystems and data.

b. Management Needs

From a management perspective, the guides and manuals provided are inadequate. This has been brought up repeatedly in the case studies and cited as a primary reason as to why middle level managers and Command level personnel

have not utilized or integrated the SNAP-II system to its full potential. There is no documentation available that gives information a manager can use effectively; it appears that all documentation is geared either to the data entry user or as a reference document for hardware and/or software maintenance.

Managers, as a group, have specific tasks and needs in relation to an information system that should be identifiable. Cohen and Cunningham discuss the creation of effective manuals for specific readers to perform specific tasks [Ref. 19:p. I]. Expanding on this, they maintain that different users need different information, with many ways to classify manuals--according to type of job, location, and intended audience [Ref. 19:p. X]. The existent SNAP-II documentation does not single out specific groups of users or provide guidance and reference tailored to specific needs. While the information is all there, it is essentially "buried" and managers are loathe to dig through the documentation to extract what they can use.

If the system is to succeed, management must understand it and be able to use it. Perryman notes that the quality of documentation is a major determinant of how well a system is received and how widely it is used [Ref. 20:p. 35]. McCann [Ref. 21:p. 8] also places emphasis on the quality of system user documentation in improving the benefit derived from a computer system.

c. Training

The adaptability of documentation to the training environment was brought up as an issue. In the present format, it was not viewed as a training document because it is oriented mostly as a reference, and was not suitably arranged by topic area. An idea advanced by Cohen and Cunningham is the concept of "bridging" the old system to the new one [Ref. 19:p. 137]. Under this concept, the user of the documentation should be given an explanation and example of the "old" and "new" at the same time. Applying this to the SNAP-II system, there is very little graphic display of what the "old" manual forms looked like and where information was entered on it, and how this relates to the SNAP-II system. It would be of great value in training new users who are presumed to have knowledge of manual system procedures.

d. Source of Documentation

The directives that NAVMASSO has promulgated concerning the development of end-user documentation [Ref. 22], and [Ref. 23] comply with the standards established by the Secretary of the Navy [Ref. 24:Encl. (1)]. On examination, these standards specify only the format of the documentation, and does not address itself specifically as to whom the documentation is aimed, stylistic content or provide guidance as to what constitutes "good" user documentation.

As these standards were developed prior to or during 1979 (pre-SNAP era), they may have been intended

specifically for use by data-processing professionals who have initial understanding about computer systems. Since that time, the advent of computer systems (such as SNAP-II) where novice end-users are placed in an interactive status requires a whole new approach to documentation--the target audience is a completely different one.

e. Existing Documentation

There are four types of documentation available to the fleet user for SNAP-II:

- SNAP-II Management Guide
- On-line Users Manual
- Users Guide
- Desk Top Guide

With the exception of the management guide, there are separate manuals and guides for each subsystem of the SNAP-II system.

The management guide gives a brief introduction to the SNAP-II system, history of software releases, and a brief, general description of each subsystem without reference to specific input or output. It could be confusing to a new manager/user, as it is interspersed with computer terms and does not state exactly what the system can do for a manager. It is geared toward managing the SNAP-II system, not managing with the SNAP-II system.

The on-line users manual is essentially a printed version of the system's on-line "AID" feature, with the objective of providing information to the user so he can use the particular subsystem effectively. Little use is made of graphics (except for type written screen examples), with text

filling the entire page. The content is organized using engineering notation (e.g., 3.1.5.2.1.16), without breaks between subjects, or tabs provided for easy subject or category reference. The approach to explaining the use of the subsystem is "top down", i.e., it starts at the entry point to the subsystem and goes down through each module, submodule, etc., with screen numbers used as reference, explaining how to input data to each individual data entry screen. Table V is a typical example [Ref. 19]. A review of one manual, the Maintenance Data Subsystem on-line users manual [Ref. 24] showed a text of 862 pages, with the table of contents (example in Table VI) alone running 27 pages. The documentation is very complete--it tells a user everything that is applicable to a subsystem. Herein lies the paradox--it overwhelms the reader by being too complete and hides information by virtue of poor format.

The users guide is a reference document intended for users having knowledge of the system in the first place. It lists and cross references files and programs, gives data element configurations, and lists error messages and corrective actions. Of all the documentation, this is the only one that lists the reports available from a subsystem in one place.

The desk top guide is a self-study document for new users. It is set up for a user to learn and master specific functions, but does not give a system overview.

TABLE V

EXAMPLE OF PAGE OF ON-LINE USERS MANUAL

3.2.2.2.2.2 Online Tickler Report by Item ID (MDS490). This screen presents a summary of records that fall within the range of filter values specified. The summary includes item ID, management code, description, work center and due date. This screen allows you to display a selected record (determined by cursor position) on a data display screen. PFKey options available from this screen are described below.

	<u>REFERENCE PARAGRAPH</u>
PF1 - Review Record (This option presents a data display screen prefilled with data from the cursor-specified record.)	3.2.2.2.3
PF9 - First Page (Depressing this option causes the first page of the report to be displayed. If the report does not have multiple pages, this option will not be available.)	
PF12 - Next Page (Depressing this option causes the next page of the report to be displayed. If no additional pages remain, this option will not be available.)	

Additional PFKeys available are PF13 for general aid as described in paragraph 3.1.3, and PFKeys 14, 15, and 16 as described in paragraph 2.1.4.4c.

3.2.2.2.2.3 Review Record for Report by Item ID (MDS508). This screen presents a data display of the record selected from the Online Tickler Report by Item summary screen. Fields will be prefilled with existing data and nonmodifiable. Selection of ENTER will return to the summary screen. Additional PFKeys available are PF13 for general aid as described in paragraph 3.1.3, and PFKeys 14, 15, and 16 as described in paragraph 2.1.4.4c.

3.2.2.2.2.4 Select Options for Report by Date Due (MDS492). This filter screen enables you to select a specific range of records for the on-line report by date due. Values that may be entered are beginning and ending Item ID's, beginning and ending Due Dates, a Modified Since Date, specific Management Codes and/or work centers (you must change the fields to "Y"). The first work center field will be prefilled with your primary work center. If you have multiple work center access, this field will be modifiable. Fields may be left blank. If fields are left blank, all values for those fields will be eligible for selection. Date value, if entered, must be in DD MMM YY format. Selection of ENTER initiates validation of the filter values entered. If any field is in error, the filter screen is redisplayed with invalid fields blinking. When no errors exist, record selection begins. Records meeting the range of filter values are displayed on the Online Tickler Report by Date Due summary screen (refer to paragraph 3.2.2.2.2.5). If no records qualify, the filter screen is redisplayed with the message, "NO QUALIFYING TICKLER RECORDS FOUND". Additional PFKeys available are PF13 for general aid as described in paragraph 3.1.3, and PFKeys 15 and 16 as described in paragraph 2.1.4.4c.

TABLE VI

EXAMPLE OF PAGE FROM TABLE OF CONTENTS

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f. Documentation Design

It would appear that the designers of the system have taken considerable effort to ensure "user friendliness" through the design of system architecture and user-interface, but have neglected documentation. Hulme [Ref. 26:p. 37] states:

The ease of understanding a piece of written material will depend not only in the characteristics of the passage, e.g., how clearly it is printed, its grammatical form, etc., but also upon the readers past experience and familiarity with the concepts involved.

Various authors have stressed the importance of using plain English without technical jargon in system documentation [Ref. 19:p. 6] and [Ref. 20:pp. 36-37]. The existing SNAP-II documentation is replete with "computerese"; "cursor selected", "screen fields", "selected data type", "card image format" and similar terms appear all too often, and serve to confuse the reader. Excessive internal cross referencing is also a detracting factor.

Format and organization of text can be extremely important. For example, in one passage from the MDS on-line users manual, the explanation for one screen is a solid block of text running half the page, single spaced. Perryman recommends that text be uncluttered, neat with wide margins, and that it be complimented with effective charts and diagrams [Ref. 20:p. 38]. The physical separation of chapters (e.g. visual cue) is also recommended, which is lacking in SNAP-II documentation.

3. Training

a. Strategy

In the overall training strategy of the SNAP-II system, NAVMASSO is tasked with providing the initial implementation training for the end users on board ship. The formal training relationship with NAVMASSO is complete upon implementation, and by extension, NAVMASSO will be out of the training business when all ships have had SNAP-II implemented. Concurrent with the phase-out of NAVMASSO in the formal training arena is the emergence of formal training responsibilities within the Navy training establishment.

As of January 1986, the Navy training establishment has not commenced a full scale training effort for the SNAP-II program. Various training commands and schools have included some SNAP-II training to one degree or another, but not all have integrated SNAP-II either specifically or as a subset to current instruction or subject areas. In and of itself, even though formal training has lagged implementation by several years, this overall strategy is not seen as having had a deleterious effect on the success of the SNAP-II program, due to the effort by NAVMASSO to assist informally after implementation and because of the relative lack of sophisticated employment of the system by fleet users at this point in the life of the SNAP-II system. This has, however, limited the ability of some ships to fully utilize the SNAP-II system and derive its intended benefits. This strategy and current status

of training should, however, be communicated formally to fleet users so that they will not become complacent and allow the system to stagnate or digress.

b. Thrust of Training

The emphasis of the training for the SNAP-II system should focus on the type of training and long term objectives, with "Who" is conducting the training as a minor issue. The concept of training in relation to a computer system can assume diverse perspectives. Differentiation can be made between users and managers [Ref. 27:p. 30], initial versus recurring training [Ref. 14:p. 63], system versus application (or product) training [Ref. 16:p. 528], and concept development versus specific skill training [Ref. 27:p. 32]. All of the aforementioned must be considered when designing and implementing a training program for a computer system. The success or failure of the system, or its effectiveness and efficiency, can be driven by the training afforded the end user [Ref. 14: p. 64]. In its current state, managers as a group are not being trained.

(1) User vs. Manager Training. Under the current implementation strategy, NAVMASSO is tasked with providing the initial end-user training in order to place the SNAP-II system in an operational status. There is no sub-strategy as to what kind of end user is being dealt with. As in the documentation issue, training should be tailored to the function of the end user in question. The Commanding Officer

or a Department Head will have different views of the system than a data entry user, and should be trained with their different perspectives in mind. The relationship of training to documentation, however, should not be regarded such that one is a substitute for the other. Senn warns that good documentation should not be a substitute for training [Ref. 16:p. 528].

(2) Recurrent Training. Once implementation training has been accomplished, the end user should not be left on his own nor should training be regarded as complete. Both Eibes and Kroenke address the idea of recurrent training. Eibes [Ref. 27:pp. 30-33] recommends a three stage "curriculum" approach to training end users. In the first stage, the "How to" aspects are addressed to novice users, focussing on the mechanics of utilizing the hardware and an introduction to the software. The recurrent training philosophy is embodied in stages two and three. Stage two entails the idea of educating users (and managers) instead of training, with the focus on concept development versus skill training. Stage three, which may be beyond the scope of SNAP-II, deals with concerns about data integrity, documentation of software developed by users, and system accountability, security and controls. Implementation, or stage one training, is not completely ignored after implementation, as there will always be new users.

Applied to SNAP-II, initial training has been provided for, but recurrent training has not. This type of

training can be divided into two areas--that which should be conducted on board, and that which should be conducted at fleet training centers or schools enroute to sea duty.

Training syllabi and materials for afloat recurrent training should be developed and provided to ships when the system is implemented. In a paper on user interface design [Ref. 27:p. 171], Thimbleby recommends that such material be provided by the designer of the system, which in this case can be construed as being either the functional manager or NAVMASSO. Currently, the subject of recurrent training is handled in diverse ways. Some ships have a strong training program, but it is a re-run of the implementation training. Guidance is necessary so that ships can carry on a strong continuing, or recurrent training program to develop a system-wide perspective of SNAP-II versus a narrow and specific subsystem application view.

Training conducted by shore commands will not be addressed here as there is insufficient experience and data to make any objective evaluations.

(3) The "Selling of the Product". The lack of a systems perspective by the end-user managers may be a detracting factor in the successful implementation and use of a computer system. The manager must understand how the system affects him and his personnel. This form of training, or education, is not present in the training strategy of SNAP-II. Eibes [Ref. 27:p. 22], in addition to the various attributes

of stage two of his three-stage curriculum, states that the "marketing" or "selling" of an information system to managers occurs at this point:

However, a majority of those receiving systems education will originate from the supervisory, managerial or even executive positions . . . The process may not even be called 'education', with terms such as 'marketing' or 'selling' being preferred.

VII. CONCLUSIONS AND RECOMMENDATIONS

Given the diversity and magnitude of the SNAP-II program, a considerable degree of success has been achieved in implementing an interactive computer system in independent afloat units having novice users, operators and maintainers. The system has been received in a positive manner by all ships that were a part of this review. A adjectival summary of various aspects of the SNAP-II program from the end users perspective is included as Table VII.

The end users have been generally satisfied with the implementation process. While there have been problems with constructing the initial data bases, these are not seen as major obstacles. The performance of NAVMASSO and the NAVSEACEN's in their implementation and support roles have been consistently very good.

The hardware and software elements of the SNAP-II program have been well received by the ships reviewed. The subject of the adequacy of the numbers of terminals was raised repeatedly, suggesting that this area needs further consideration. As an adjunct to this, several ships have reported that the word processing function seriously slows down system response time, although this was not quantifiable. An alternative to this, should it be technically and economically feasible, would be to install "intelligent terminals" capable

TABLE VII
SUMMARY OF SHIPS EVALUATIONS

	Implemented Process	Hardware	Software	Training	Documentation	NAVMASO NAVSEA Support	Communication Program Guidance	MGT w/ System
CASE 1	Good	Very Good	Good	Fair	Fair	Very Good	Fair	Very Good
CASE 2	Fair	Good	Good	Fair	Poor	Very Good	Fair	Fair
CASE 3	Fair	Good	Fair	Fair	Poor	Very Good	Poor	Fair
CASE 4	Fair	Good	Good	Poor	Poor	Very Good	Fair	Poor
CASE 5	Good	Very Good	Good	Poor	Poor	Very Good	Poor	Good
CASE 6	Good	Good	Good	Fair	Fair	Very Good	Poor	Good

of handling the word processing function locally instead of in the Central Processing Unit. These terminals should remain networked to the minicomputer for the purposes of performing the designed SNAP-II functions.

The degree of integration of the SNAP-II system into the shipboard operating environment has varied from ship to ship. As has been noted, some ships are operating different types of computer systems--some at the basic transaction processing level, some at a higher level. The level of computer expertise and character of the command prior to SNAP-II implementation has had a certain bearing on this, but there are also external intangible, or non-material factors that are influencing this.

As noted, documentation for end users was not considered effective by the ships interviewed. Closely related to this was the type of training being conducted for shipboard personnel. Both these areas require revision to increase the effectiveness of the SNAP-II system and insure that all levels of end users are utilizing the system to its full extent.

A difficult area to assess is the SNAP-II program itself. End users have voiced concern about what they perceive as a lack of policy guidance and an understanding of just how SNAP-II is to be used in relation to managing their ships. In and of itself, this may reflect a lack of adequate communication between the fleet and program management.

The program has provided for four of the five components of a computer system as defined by Kroenke, leaving the key

area of "procedures" in an undefined state. This is not a fault of the program. An analogy that best illustrates this drawback would be the procurement of a weapon system. A program manager would be responsible for obtaining the hardware itself, but would not be responsible for developing tactics to employ it. This is where SNAP-II finds itself.

Because of the different functional managers and sponsors present in the SNAP-II program, there are diverse forces at work. Each is interested in ensuring that their subsystems are functional and implemented. While the SNAP-II program office is concerned primarily with implementing the system in the fleet (which it is doing well), it appears no one office is charged with absolute control as to what exactly the SNAP-II system is to be or how it is to be integrated into the management of a ship. Ostensibly, the Program Coordinator (OP-945) should be in full charge of these matters, but that may be impracticable given the nature of the organization-- they are concerned with computer systems, not management of a ship. The identification of a central point charged with defining exactly what SNAP-II is to do and how it is to do it is highly recommended. Once this is accomplished, standards can be developed and promulgated to fleet units.

Having implemented the SNAP-II system, some gauge of its effectiveness and use by fleet users is necessary, both to point out areas for possible improvement in the program and to ascertain that fleet units are using the system to its

full benefit. A post implementation review process as an integral part of the SNAP-II implementation process is highly recommended. Standards must be developed to accomplish this, as noted in the preceding paragraphs.

In summary, the Navy has introduced a computer system that has been well received by the fleet users interviewed. However, there are concerns and minor problems that prevent it from being utilized to the most efficient extent possible. These can be corrected by:

- . better communication with the end user
- . revision of training policy
- . revision of documentation
- . identification of a central control point for program policy, guidance, and standards

APPENDIX A: ACRONYMS

3-M - Material Maintenance Management Program
ADM - Administrative Data Management Subsystem
ADP - Automated Data Processing
AE - Auxiliary - Ammunition ship
AFS - Auxiliary - Refrigerated Stores ship
AIS - Automated Information System
AMS - Aviation Maintenance Subsystem
AO - Auxiliary - Oiler
AOE - Auxiliary - Ammunition/Oiler
AOR - Auxiliary - Oiler/Replenishment
APL - Allowance Parts List
ASW - Anti-submarine Warfare
BB - Battleship
BOR - Budget OPTAR Report
CASREP - Casualty Report
CDA - Central Design Activity
CG - Guided Missile
CGN - Guided Missile Cruiser Nuclear Powered
CIC - Combat Information Center
CK - Configuration Change
CMPM - Current (Ship's) Maintenance Project Master
CNO - Chief of Naval Operations
CO - Commanding Officer

COBOL - Common Business Oriented Language

COM - Communications

COMNAVSURFLANT - Commander, Naval Surface Forces, U.S.
Atlantic Fleet

COMNAVSURFPAC - Commander, Naval Surface Forces, U.S.
Pacific Fleet

COMSUBPAC - Commander Submarine Force, U.S. Pacific Fleet

CONUS - Continental United States

COSAL - Consolidated Shipboard Allowance List

CPU - Central Processing Unit

CSO - Combat Systems Officer

CSMP - Current Ship's Maintenance Project

DD - Destroyer

DDG - Guided Missile Destroyer

DH - Department Head

DLR - Depot Level Repairable

DS - Data System Technician

DSC - Data System Technician Chief Petty Officer

DSS - Decision Support System

EM - Electrician Mate

EMC - Electrician Mate Chief Petty Officer

EMO - Electronics Material Officer

ET - Electronics Technician

EW - Electronic Warfare Specialist

FAS - Functional Area Supervisor

FF - Frigate

FFG - Guided Missile Frigate

FTC - Fleet Training Center

FY - Fiscal Year

INSURV - Board of Inspection and Survey

LOGMARS - Logistics Application of Automated Marking and
Reading Symbols

LPD - Landing Platform Dock

LST - Landing Ship Tank

MDS - Maintenance Data Subsystem

MEASURE - Metrology Automated System for Uniform Recall and
Reporting

MIS - Management Information System

MLS - Mobile Logistics Support Force Subsystem

MMCM - Machinist Mate Master Chief Petty Officer

NAMMSO - Navy Material Management Support Office

NAVMASSO - Navy Management Systems Support Office

NAVMASSO DETPAC - Navy Management Systems Support Office
Detachment Pacific

NAVSEA - Naval Sea Systems Command

NAVSEACENLANT - Naval Sea Systems Command Center Atlantic

NAVSEACENPAC - Naval Sea Systems Command Center Pacific

NAVSUP - Naval Supply Systems Command

NEC - Navy Enlisted Classification

NMPC - Navy Military Personnel Command

NSCS - Navy Supply Corps School

NWS - Naval Weapons Station

OMMS - Organizational Maintenance Management Subsystem

OPNAV - Office of the Chief of Naval Operations

OPS - Operations Officer

OPTAR - Operating Target

PC - Postal Clerk

PCO - Prospective Commanding Officer

PCS - Permanent Change of Station

PMS - Planned Maintenance System

PN1 - Personnelman First Class

PNC - Personnelman Chief Petty Officer

PQS - Personnel Qualification Standard

RAV - Restricted Availability

RFT - Ready For Training

SDSA - Source Data System Afloat

SECNAV - Secretary of the Navy

SEF - Ship's Equipment File

SEL - Selected Equipment List

SFM - Supply and Financial Management Subsystem

SFOEDL - Summary Filled Order and Expenditure Difference
Listing

SFOMS - Ship's Force Overhaul Management System

SFWL - Ship's Force Work List

SK - Storekeeper

SKC - Storekeeper Chief Petty Officer

SKCS - Storekeeper Senior Chief Petty Officer

SMA - Systems Management American Corporation

SMS - Systems Management Subsystem

SNAP - Shipboard Non-tactical ADP Program

SOAP Team - Supply Overhaul Assistance Program Team

SPCC - Ship's Parts Control Center
SWO - Surface Warfare Officer
SWOS - Surface Warfare Officer School
SWOSCOL - Surface Warfare Officer School
TAD - Temporary Additional Duty
TECDOC - Technical Document Module
TYCOM - Type Commander
UADPS - Uniform Automated Data Processing System
UNREP - Underway Replenishment
VOS - Vulcan Operating System
WSF - Weapons Systems File
XO - Executive Officer
YNC - Yeoman Chief Petty Officer

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